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Income and Lottery Sales: Transfers Trump Income from Work and Wealth

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Abstract

The effect of income on lottery expenditures has generally been studied using an aggregate measure of income, usually personal income. Reasons exist for thinking that lottery expenditures do not respond equally to all sources of income. This paper examines lottery consumption and income from three sources, namely income from earnings, wealth, and transfer payments. Using county-level data for seven states and controlling for demographic and other characteristics, we find that each source of income has a different effect on lottery ticket expenditures. A noteworthy finding is that purchases are most strongly influenced by changes in transfer payments. Several policy implications follow from our results.

Keywords: State lottery, consumption, propensity to consume, income
JEL Codes: H71, H31

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Income and Lottery Sales: Transfers Trump Income from Work and Wealth

I. Introduction

Growth in the nearly $50 billion a year state lottery industry over the past 40 years has sparked much research on the demand for lottery tickets.[1] Studies have explored the effects of the economic and demographic characteristics of lottery players on lottery ticket purchases, such as educational attainment, employment status, age, and race. The literature has given the greatest attention to the relationship between player income and lottery ticket purchases to determine the tax incidence (i.e., the regressivity or progressivity) of state lotteries (Clotfelter and Cook, 1987, 1989; Scott and Garen, 1994; Hansen, 1995; Farrell et al. 1999; Price and Novak, 1999; Forrest et al., 2000; Kearney, 2005; Garrett and Coughlin, 2007).[2] In the present paper we examine the relationship between income and ticket purchases; however, we focus not on the tax incidence issue, but rather on the connection between different sources of income and lottery ticket purchases.

Prior studies of lottery demand have typically used an aggregate measure of income such as personal income, which consists of earnings income, wealth income, and transfer payment income. The use of personal income in models of lottery demand assumes that lottery expenditures respond the same to a $1 increase in transfer income as they do to, say, a $1 increase in earnings income. In the present case, this would imply

[1] Beginning with New Hampshire in 1964, forty-two states and the District of Columbia have since legalized state-sponsored lotteries. Lottery ticket sales in the United States topped $48 billion in fiscal year 2006 (roughly $160 per capita), of which state governments retained nearly $17 billion (about 1 percent of total state government revenue) for spending on education, infrastructure, and other programs.

[2] This is not a complete list of all lottery demand studies. See the above studies for additional references. The majority of research has shown that state lotteries can be characterized as a regressive form of taxation.

that the marginal spending on lottery tickets is the same across income sources. Our empirical analysis examines the accuracy of this implicit assumption.

This paper examines the marginal spending on lottery tickets from transfer payment income, wealth income, and earnings income. We use 2005 county-level data for seven states in our analysis – West Virginia, Florida, Iowa, California, New York, Illinois, and Indiana. Our hypothesis is that the effect of an additional $1 in income on lottery ticket expenditures is different depending upon the source of income; however, we have no firm priors on the relative magnitudes of the marginal spending from different income sources. The foundations for our hypothesis can be found in various theoretical and empirical studies that are discussed more fully in the next section of the paper.

We find evidence that lottery ticket expenditures respond differently to changes in various income sources. Specifically, marginal spending on lottery tickets from transfer payment income differs from earnings and wealth income. In most cases, marginal spending from transfer payment income exceeds marginal spending from other income sources. Frequently, these differences are statistically significant. Additional results suggest that the impact of transfer payments is not limited to retirement benefits; transfer payments associated with income maintenance are statistically significant nearly as often as retirement benefits. Our results suggest that previous models of lottery demand that only considered an aggregate measure of income fail to capture important differences in spending patterns by different demographic groups. In addition, the finding that spending on lottery tickets differs by income source has implications for state lottery revenue forecasting as well as raising normative issues regarding the efficiency of state lottery finance and the state programs that are funded by state lottery revenue.

II. Why Marginal Spending on Lotteries Might Differ Across Income Sources

Either of two general arguments suggests that spending on lotteries might respond differently to identical increases in income from different income sources. One explanation relies on the fact that the spending patterns of people with different types of income are different — an additional $1 to an average retiree, whose income consists of transfer payments to a far greater extent than an average worker, is spent differently than an additional $1 to a working individual. A second explanation is that people spend money from different income sources differently — an additional $1 in social security benefits to a retiree is spent differently than an additional $1 in dividend income to the same retiree. The key distinction is that the former is an interpersonal comparison while the latter is an intrapersonal comparison. Even though these reasons are straightforward, it is useful to review the theory and evidence supporting these explanations.

Different Groups, Different Income Sources, and Different Spending Patterns

In most empirical studies, lottery spending is regressed on personal income and various demographic characteristics. These characteristics frequently have significant explanatory power, suggesting that lottery spending is related to the value of a demographic characteristic. At the same time, the shares of income across income sources by demographic characteristic vary. Information on the differences in income sources at the national level for various groups can be found in the *2006 Consumer Expenditure Survey (*CES).[3] The three demographic characteristics used in our analysis

[3] See www.bls.gov/cex.

are age, race, and educational attainment.[4] A few examples follow in order to highlight the connection between income sources and demographic characteristics.

The most pronounced differences in sources of income are related to age. Differentiating between those aged 65 and older from those less than age 65, one finds the older group tends to have larger income shares accounted for by wealth and transfer payments and a smaller income share accounted for by earnings from work than the younger group.[5] For example, transfer payments account for 55.9 percent of the money income of the older group and 4.8 percent of the money income of the younger group. Differentiating between those who are black or African-American (CES classification) and those who are not, one finds only slight differences. For those who are black or African-American, the income shares accounted for by earnings from work and transfer payments tend to be somewhat larger than those who are not black or African-American. This result also implies a relatively smaller share of income from wealth for the former group. For example, the share of money income from wealth was 0.5 percent for blacks or African-Americans versus 2.6 percent for those who are not. Finally, differentiating between those lacking a high school diploma and those with a high school diploma or more, one finds that the former group has relatively smaller shares of money income accounted for by earnings from work and from wealth and a larger share accounted for by transfer payments. For example, transfer payments were 23.4 percent of money income

[4] These variables are commonly included in lottery spending studies. Jackson (1994) and Hansen et al. (2000) are two of numerous examples. We also control for county unemployment. In terms of income shares, a higher unemployment rate would tend to reduce the share of earnings from work and increase the share of income from transfer payments.

[5] Our calculations are based on money income before taxes and treat two categories, which account for roughly one percent of money income, as unclassified. These categories are regular contributions for support and other income. Additional details are available upon request.

for those lacking a high school diploma and 10.0 percent for those with at least a high school diploma.

In the present study the existence of differences in the sources of income across demographic groups is not the end of the story. Spending patterns must also vary for a specific characteristic. For example, much evidence exists indicating that spending patterns vary with age. This evidence begins with life-cycle theories of consumption. Fernández-Villaverde and Krueger (2007), using *Consumer Expenditure Survey* data, find significant humps over the life-cycle for both nondurable and durable expenditures. In another study using *Consumer Expenditure Survey* data, Paulin (2000) finds numerous differences between the expenditure patters of older and younger consumers. Not surprisingly, health care spending is a larger share of total expenditures for those aged 65 and older than for those less than 65 years old.

With respect to spending on lottery tickets, an empirical regularity is that those aged 65 and older buy lottery tickets at a different rate than those less than 65 years old. For example, Jackson (1994) and Hansen et al. (2000) have found that spending on lottery tickets by those 65 and older exceeds those less than 65.

Why Different Sources of Income Might Not Be Spent the Same by an Individual

A common presumption in studies of spending and saving, such as Friedman (1957), is that all income is fungible. In other words, a dollar of income is treated the same regardless of whether it was earned as the result of one's own labor, received as earnings stemming from one's wealth, or received as a transfer payment. Consequently, the source of the income should not affect one's spending or saving decisions.

Nonetheless, economic theory as well as empirical studies raises doubts about this common presumption that the marginal propensities to consume (MPC) out of different sources of income are equal.

Using economic theory, either modifications of underlying assumptions or adding some constraints can eliminate the fungibility of different sources of income. One example of modifying underlying assumptions is Shefrin and Thaler's (1988) behavioral life-cycle model.[6] In this model, the way accounts are viewed or framed affects the extent to which the account affects spending. One formulation of this model uses three broad accounts — a current income account, an asset account, and a future income account. In contrast to the common presumption that the MPC all types of wealth are equal, the temptation to spend from these accounts differs. The MPC from current income has the highest value (close to one), while the MPC from future income has the smallest value (close to zero). The MPC from the asset account falls somewhere in between.

In addition to the mental accounts with differential MPCs, the standard life-cycle model is altered by assuming that people tend to be impatient (i.e., one's discount rate exceeds the interest rate) and lack self-control with respect to current consumption. The recognition that controlling spending is difficult leads people to take actions individually and legislatively to constrain their consumption behavior. The Social Security system can be viewed as legislated self-control. With respect to internally enforced self-control, the prudent household limits its borrowing from the future income and asset accounts to

[6] See also Thaler (1990). In a standard life-cycle model an individual determines his consumption in a given year in the following way. First, he computes the present value of his wealth using current income, net assets, and future income. Second, he computes the annuity that could be purchased with this wealth. Third, he should consume exactly what he would receive if such an annuity were owned.

finance current consumption. Exactly what the behavioral life-cycle model implies for spending on a specific item such as lotteries is unclear, however.

In addition to modifying the underlying assumptions related to human behavior, it is also possible to affect spending and saving behavior by altering the incentives to spend and save. Depending on the incentive, the impact might be on overall consumption or saving or on a specific consumption item or savings instrument. Given our focus on lotteries, an excellent example is provided by Laitner (1999), who explores the connection of means tests for public assistance with gambling expenditures.

Specifically, Laitner (1999) addresses why those with low incomes tend to spend more on gambling than those with high incomes. Public assistance programs may change the risk-taking behavior of those with low incomes so that they save significantly less relative to their permanent income than those unlikely to qualify for public assistance. Because recipients of public assistance can become ineligible for benefits if their assets exceed some threshold, their incentive to save is reduced. Moreover, they also have a strong incentive to participate in risky gambling activities, such as a lottery. The reasoning is straightforward. If the gambler wins the lottery, then the large payoff means the gambler no longer qualifies for public assistance. If the gambler loses, then public assistance reduces the cost of the lottery ticket to near zero. On the other hand, the incentive for those with high incomes to purchase lottery tickets is not affected by the means tests for public assistance.

In addition to the preceding theoretical arguments, a number of empirical studies conclude that the marginal propensity to consume various goods from different income sources is not the same. For example, in a study of farm families, Carriker et al. (1993)

find differences in the propensity to consume from farm income, non-farm income, and government payment income. Hymans and Shapiro (1976) find that the marginal propensities to consume food out of transfer payment income and other subsidy income are higher than the MPC from wage income. Holbrook and Stafford (1971) demonstrate that the MPC varies across different types of permanent income. They found that the MPC out of labor income was 0.9, the MPC out of capital income was 0.7, and the MPC out of transfer income was 0.3. A recent example involves estimates of the wealth effect on consumption spending. Case, Quigley, and Shiller (2005) compare the effects of changes in housing wealth and financial wealth on household consumption and show that changes in the former tend to have a larger impact than the latter. Finally, consistent with Shefrin and Thaler's (1988) reasoning, Baker, Nagel, and Wurgler (2006) find that the propensity to withdraw and spend dividends on consumption is much higher than for capital gains.

The preceding explanations and evidence provide justification for our analysis. However, the underlying theory and evidence do not produce firm expectations about how marginal spending on lotteries might differ across income sources. For example, if one views spending on lotteries as discretionary spending, then one might expect marginal spending on lotteries to be smaller for transfer income than for other income sources. On the other hand, there might be economic incentives for those relying on transfer income to attempt to "hit it rich." Thus, we do not have strong expectations concerning the results. We should also note that we make no attempt to discriminate between the two explanations; our county-level data precludes this possibility. Our goal is to simply see what insights, if any, disaggregating income into its sources provides.

III. Data and Empirical Methodology

We obtained county-level instant and online lottery game sales data for 2005 from the seven states.[7] Our sample of states is based on lottery data availability, the desire to compare the empirical results across an adequate number of states representing different parts of the country, and each state having enough counties to ensure a sufficient number (we chose 50) of cross-sectional observations (and thus degrees of freedom) for state-specific analyses. Per capita lottery sales for each of the seven states and the pooled sample of states are shown in the first three columns of Table 1.[8]

[Table 1]

County-level income data for the seven states for 2005 were obtained from the Bureau of Economic Analysis (BEA), Local Area Personal Income. As in previous studies, the aggregate measure of income used in our analysis is per capita personal income. The individual income sources we consider are: 1) net earnings by place of residence (which we term earnings income); 2) dividends, interest, and rent (which we term wealth income); and 3) personal current transfer receipts (which we term transfer income).[9]

[7] We would prefer to have lottery ticket expenditure and income data at the individual level. To our knowledge, however, no individual-level data exist that document a lottery player's ticket expenditure and the sources of that player's income. Kearney (2005) uses individual level data from the Consumer Expenditure Survey (CES) to explore the effect of lottery ticket purchases on other consumption goods. However, even the relatively comprehensive CES data does not consider lottery ticket purchases (or any other form of gambling) as a separate expenditure category.

[8] The portfolio of lottery games offered in each of the seven states is similar, but there are some differences. Florida is the only state that does not participate in any multi-state game. Illinois, New York and California participate in the multi-state game Mega Millions and West Virginia, Iowa, and Indiana participate in the multi-state game PowerBall. Each state has its own lotto game as well as daily numbers games. Regarding instant lottery games, all states offer one or two dozen instant lottery games at a time. The $1 instant game is available in each state and all states offer higher priced instant games as well – up to $20 in Iowa, Illinois, and New York, up to $30 in Florida and Indiana, and up to $5 in West Virginia and California.

[9] See Table CA05 – Personal Income and Detailed Earnings by Industry at www.bea.gov/regional/reis/. The three income components are found in lines 45, 46, and 47.

Personal current transfer receipts are available by sub-component, such as unemployment insurance, Medicare benefits, and social security benefits. Some transfer payments, such as Medicare benefits, which account for roughly 45 percent of all transfer payments in the United States, and transfer payments to non-profit organizations, are not actually income to the individual that can then be spent on lottery tickets. Thus, our measure of transfer payments considers only those transfers representing direct payments to individuals, and is the sum of OASDI (social security retirement benefits and disability), supplemental security income (SSI), family assistance, other income support benefits, unemployment compensation, and Veterans pension and disability benefits.[10]

Descriptive statistics for total personal income and the three income components are also shown in Table 1. As seen in Table 1, earnings income is the largest component of all income in each state, accounting for 64.1 percent of income across the seven states. Earnings income per capita is the highest in California ($21,673) and the lowest in West Virginia ($14,231). Wealth income is the next largest share of all income (16.6 percent for the seven states) in each state except West Virginia, where transfer payment income is 13.6 percent (10.3 percent across the seven states) of all income and wealth income is only 12.0 percent of all income.

The availability of detailed transfer payment income from the BEA allows us to break down our transfer payment variable into two additional variables — retirement income and maintenance income. Retirement income is the sum of OASDI (social security retirement benefits and disability) and Veterans pension and disability benefits.[11]

[10] See Table CA35 – Personal Current Transfer Detail at www.bea.gov/regional/reis/. The transfer payment variable is the sum of lines 40, 130, 140, 160, 170, and 240.
[11] See Table CA35 – Personal Current Transfer Detail at www.bea.gov/regional/reis/. The retirement income variable is the sum of lines 40 and 240.

Maintenance income is the sum of unemployment insurance and income support benefits.[12] As seen in Table 2, retirement income accounts for roughly 81 percent of our adjusted measure of transfer payment income across the seven states, with a low of 71 percent in California and a high of over 86 percent in Iowa.

[Table 2]

Two related reasons exist for disaggregating transfer payments. First, from the perspective of an individual (or a household), one can view retirement income as permanent income and maintenance income can be viewed as temporary income. Second, in the context of a behavioral life-cycle model, the mental accounting with respect to these sources of transfer payments is likely to lead to separate accounts. One might think that the maintenance income would be used for necessities, while the retirement income would allow for some discretionary spending, some of which might be used for lottery purchases.

We estimate nine regressions using our pooled sample of seven lottery states, as well as nine regressions for each of our seven lottery states. First, we regress per capita lottery sales (instant sales, online sales, and total sales separately) on our aggregate measure of per capita personal income. We then regress lottery sales (again, instant sales, online sales, and total sales separately) on our three income components (earnings, wealth, and transfers), as well as on earnings, wealth, and the two transfer payment components (retirement income and maintenance income). The coefficient estimate on each income variable reflects the marginal spending on lottery tickets out of the respective income source. We can thus examine and conduct statistical tests for any

[12] See Table CA35 – Personal Current Transfer Detail at www.bea.gov/regional/reis/. The income maintenance variable is the sum of lines 130, 140, 160 and 170.

differences in the marginal spending out of total income versus the components of income, as well as any differences across the income components.

Following the literature on the demand for lottery tickets, we include several economic and demographic control variables in each of our regression models. These demographic variables do not capture any differences in marginal spending by different groups of people, they simply capture whether the size of each demographic group is a significant determinant of lottery ticket expenditures. It is the coefficients on the income component variables that will provide insight into any differences in spending by different demographic groups. Nonetheless, it is important to control for the size of various demographics to ensure that the income variables are only reflecting changes in income and not the demographic and economic (other than income) makeup of the county population.

The demographic and economic variables we include are: 1) the percent of the county population that is white, 2) the percent of the county population age 18 or older that only has a high school diploma, 3) the percent of the county population that is age 65 or older, 4) the county unemployment rate, and 5) a border dummy variable that takes the value of '1' if a county borders another state, '0' otherwise, to capture the effects of cross-border lottery shopping (Garrett and Marsh, 2002; Tosun and Skidmore, 2004).[13]

[13] The unemployment rate was obtained from the Bureau of Labor Statistics. The percent of the county population that is white was obtained from the U.S Census, *Intercensal County Population Estimates by Age, Sex, and Race* (2000-2005). The percent of the county population age 18 or older with only a high school diploma was obtained from the U.S. Census, 2000 Decennial Census. The percent of the county population age 65 or older was obtained from the U.S. Census, *County Population Estimates – Characteristics.* We also considered the percent of the county population below the poverty level as an explanatory variable. This variable, however, was highly correlated with the percent of the county population with a high school diploma and the percent of the county population that is white. Gender was also considered but little variation in this variable across counties led us to omit this variable from the final analysis.

Our pooled analysis also includes state dummy variables to capture heterogeneity in lottery sales across the seven states.

IV. Empirical Results

The presentation of empirical results stresses the connection between income and lottery ticket spending. We report the complete regression results in Tables A1 through A8 located in the Appendix. Our discussion begins by presenting the estimates of the marginal spending on lottery tickets out of overall income and out of the three components of income (earnings income, wealth income, and transfer income). We then discuss the results of equality tests that examine whether marginal spending on lottery tickets varies across the three components of income. Finally, we present the estimates of the marginal spending on lottery tickets out of the two transfer income components (maintenance income and retirement income) as well as equality tests between these two transfer income components and earnings income and wealth income.

Our estimates of the marginal spending on lottery tickets out of income and the three components of income are shown in Table 3. The estimates listed in Table 3 are per $100 of income (the coefficient on income from the respective Appendix table multiplied by 100). Thus, the value of 0.17 for total sales in the pooled sample means that for a $100 increase in per capita income, total spending on lottery tickets increases 17 cents. In our discussion we will use "statistical significance" to refer to statistical significance at 10 percent or better.

[Table 3]

The results from the pooled sample of lottery states reveal that, overall, marginal spending on lottery tickets out of all income, earnings income, and transfer income is statistically significant. We find no evidence that marginal spending out of wealth income is statistically significant in our pooled sample of states. Specifically, marginal spending on online lottery games and all lottery games is 17 cents per $100 in personal income. The estimates for earnings income are slightly higher - marginal spending is 19 cents and 21 cents per $100 for online games and all games, respectively. Considering transfer income, however, we find that marginal spending on instant lottery games is $1.72 per $100 in transfer income and marginal spending on online games out of transfer income is 59 cents per $100. Marginal spending on all lottery games out of transfer income is $2.31 per $100. Thus, in our pooled sample of states, marginal spending on lottery tickets out of transfer income is higher than marginal spending out of other income sources. A question we address later is whether these differences are statistically significant.

Turning to the results for each state, the findings for West Virginia provide little evidence that the marginal spending on lottery tickets out of the three income components is statistically significant. In fact, in each case the overall adjusted explanatory power declines as the individual income components replace all income (see Appendix Table A2). For instant sales, neither all income nor any of the individual income components are statistically significant. The results for online and total lottery purchases are much stronger with all income being statistically significant in both cases. Nonetheless, disaggregating income into the three income components yields little, with wealth income in the online sales regression being the only individual income component that is statistically significant.

The results for Florida show that the overall adjusted explanatory power increases as the individual income components replace all income. All income is not statistically significant in the regressions for instant sales, online sales, and total sales, while earnings income is statistically significant for instant sales and transfer income is statistically significant for both online sales and total sales. One might also note that the marginal spending on lottery tickets from transfer income is substantially larger than from the other two income sources. Looking at total sales, the marginal spending on lottery tickets from transfer income is over $5 per $100 in transfer income while the estimates of marginal spending on tickets from earnings income and wealth income are much less (and not statistically different than zero in most cases).

The results for Iowa are similar to those for Florida. In each case the overall adjusted explanatory power increases as the individual income components replace all income. The marginal spending on tickets out of total income ranges from 12 cents to 26 cents per $100 in income depending upon game type. The marginal spending on tickets out of earnings income is statistically significant for online sales (9 cents per $100) and total sales (19 cents per $100). The marginal spending on tickets out of transfer income is statistically significant for all game types and, as with Florida, the results for Iowa reveal that the marginal spending on lottery tickets out of transfer income is larger ($1.63 to $5.04 per $100) than the marginal spending on tickets out of earnings income and transfer income.

The results for California are similar to the results for West Virginia. In each case the overall adjusted explanatory power declines as the individual income components replace all income. All income is only statistically significant in the regression for instant sales. Moreover, it has a negative impact on instant sales. Only two individual income components are statistically significant — wealth income in the instant sales regression and transfer income in the online sales regression — and both have a negative impact on sales.

The results for New York are similar to those of Iowa and Florida. In each case the overall adjusted explanatory power increases, albeit slightly, as the individual income components replace all income. The marginal spending on tickets out of transfer income is statistically significant and has a value of $5.16 per $100 in transfer income, while the marginal spending on instant tickets out of total income is not statistically different than zero. For total sales and online sales, the marginal spending on tickets out of total income are statistically significant and have similar magnitudes (29 cents and 23 cents per $100, respectively) to the estimates for Iowa and West Virginia. As in Florida and Iowa, the marginal spending on tickets out of transfer income is much larger than those from other income sources. In New York, the marginal spending on tickets ranges from $5.16 per $100 for instant games to $10.64 per $100 for all lottery games.

The results for Illinois and Indiana are similar, except for marginal spending out of wealth income. For Illinois, we find that marginal spending on instant games and all lottery games is 65 cents per $100 and 77 cents per $100, respectively. The only other states in which we found a significant relationship between wealth income and lottery spending is West Virginia. Marginal spending out of all income is 21 cents per $100 in

Illinois and 15 cents per $100 in Indiana (all lottery games). Marginal spending out of transfer income is not a significant determinant of lottery sales in Illinois and Indiana, although the point estimates are larger than those for other income sources.

At this point, it is worth summarizing the results presented in Table 3. The marginal spending on tickets out of total income is statistically significant in 15 of the 24 regressions and ranges from -7.2 cents per $100 to 29 cents per $100.[14] Of the three components of income, there is clear evidence that the marginal spending on tickets out of transfer income is larger (ranging from -$1.97 per $100 to $10.64 per $100) and more often significant than the marginal spending on tickets out of earnings income or wealth income. The marginal spending on tickets out of earnings income and wealth income are statistically significant in eight and four, respectively, of the 24 regressions, while the marginal spending on tickets out of transfer income is statistically significant in 12 of the 24 regressions.

An important question is whether the estimates of marginal spending shown in Table 3 are statistically different. Table 4 contains the results of equality tests (*F*-tests) for the marginal spending on tickets out of each income component. A consistent finding for each of the seven state states and the pooled sample is that the marginal spending on lottery tickets does not differ between earnings income and wealth income except with respect to instant lottery games in Illinois. Differences are found, however, when the results for transfer income are examined. For Florida, Iowa, New York, and the pooled sample of states, the marginal spending on lottery tickets differs between transfer and

[14] We discuss the implications of negative marginal spending on lottery tickets in the last section of the paper.

earnings income as well as between transfer income and wealth income for various categories of lottery games.

[Table 4]

Given the importance of transfer income in explaining lottery tickets purchases and the availability of data on the components of transfer income, we present the estimates of marginal spending on tickets out of retirement income and maintenance income. These estimates are shown in Table 5 along with estimates of marginal spending out of all income, earnings income, and wealth income.[15]

[Table 5]

As seen in Table 5, the marginal spending on tickets out of retirement income is statistically significant in 12 of 24 cases (and negative in 2 cases) and the marginal spending on tickets out of maintenance income is statistically significant in eight of 24 cases (and negative in 1 case). The insights generated by disaggregating transfer income are highlighted by the results for Iowa and New York. For Iowa, recall that transfer income was statistically significant for all three dependent variables. The results in Table 5 indicate that those results are driven by maintenance income. Maintenance income is statistically significant for all three dependent variables, while retirement income is not statistically significant. On the other hand, the results concerning transfer income for New York can be attributed to retirement income. Retirement income is statistically significant for all three dependent variables, while maintenance income is not significant.

[15] The replacement of transfer income with retirement and maintenance income, not surprisingly, affects the overall explanatory power of some models. Generally speaking, the effects for West Virginia, New York, Illinois, Indiana, and the pooled sample are minimal, while the effects for Florida, Iowa, and California are noteworthy (see Appendix Tables A1-A8). For example, disaggregating transfer income into retirement and maintenance income is associated with an increase of the adjusted R^2 for all lottery games from 0.29 to 0.36 in Florida, 0.14 to 0.19 in Iowa, and 0.07 to 0.11 in California.

Generalizing across the states, the results from the pooled sample in Table 5 reveal that the marginal spending on instant lottery games and all games is much higher for retirement income and maintenance income than other income sources. Specifically, we find that marginal spending on instant lottery games is $1.41 per $100 in retirement income and $3.18 in maintenance income across the seven states. Marginal spending on all lottery games is $1.81 per $100 in retirement income and $4.67 in maintenance income. We find, however, that the components of transfer income do not explain online lottery game sales while overall transfer payments were found to explain online lottery games sales (Table 3).

Turning to the tests for the equality of the marginal spending on lottery tickets in Table 6, there is evidence that these differ statistically across income source. Comparing the estimates of marginal spending for retirement income with maintenance income, one finds a statistically significant difference in nine of 24 cases. Comparisons of retirement income with earnings and wealth income and comparisons of maintenance income with earnings and wealth income yield similar results.

The pooled results in Table 6 reveal that, for instant games and all games, marginal spending out of maintenance income is statistically different than marginal spending out of earnings income and wealth income. Similarly, marginal spending out of retirement income is statistically different than marginal spending out of earnings income and wealth income. However, marginal spending out of retirement income is not statistically different than marginal spending out of maintenance income.

[Table 6]

V. Discussion and Concluding Comments

Our analysis was motivated by numerous theoretical and empirical studies whose results suggested that marginal spending on individual goods and services as well as in the aggregate might differ across income sources. The existing studies provided two explanations as to why marginal spending on lotteries might differ across income sources. One explanation highlights the fact that different demographic groups have both different income sources and spending patterns. A second explanation stresses that the different sources of income might not be spent the same on the margin by an individual. Our study explored the marginal spending on lottery tickets out of various sources of income, namely earnings income, wealth income, and transfer payment income.

The results of the empirical analysis provide evidence that all income is not the same in the case of lottery ticket purchases. This conclusion is demonstrated succinctly by the results based on pooling all the sample states. Marginal spending on lottery tickets out of transfer income, as well as out of its retirement and income maintenance components, is larger than marginal spending on lottery tickets out of earnings income and wealth income. Moreover, for instant sales and for total sales, marginal spending out of transfer payments, as well as out of its retirement and income maintenance components, differs significantly from the other two income measures.

For the seven lottery states used in the analysis, we found that in the majority of cases the marginal spending on lottery tickets out of transfer income is larger (and more often statistically significant) than the marginal spending on tickets out of earnings income and wealth income. In addition, the marginal spending on lottery tickets out of two components of transfer income – maintenance income and retirement income –

significantly explain lottery sales and are significantly different in the majority of regressions.

The marginal spending on lottery tickets out of transfer payments was larger than we expected for many states. Our surprise reinforces the value of our study. The result that the marginal spending on lottery tickets out of transfer income is larger than for other income sources is a likely result of the demographic makeup of lottery players. Past studies on the demand for lottery tickets cited in the introduction of this paper have showed that lower income individuals and older individuals are most likely to play the lottery compared to other demographic groups.

Furthermore, our empirical models not only considered different sources of income, but also the demographic makeup of the county population. So, unlike earlier studies, we are more directly comparing the influence of particular types of income on lottery ticket purchases holding the respective demographic characteristic constant. This is an interesting exercise, given that the size of a certain demographic in a county, say, the percentage of the county population over age 65, does not capture the income of this demographic as well as a measure of this demographic's source of income, such as transfer payments and, more specifically, retirement income. Our models thus not only capture the size of a particular demographic, but also more precisely account for the income of this demographic.

Although we generally find that across states marginal spending on lottery tickets differs by income sources across the states, the empirical results are not consistent across each state. For example, we find little evidence of any relationship between income sources and lottery ticket spending in West Virginia and California, and marginal spending is not the same across the types of lottery games across the states. One reason for these findings may include the relatively small sample size for some of the states. Also, our analysis included only one year of data, so any factors that increases the variability of lottery sales across counties in that year is likely to result in weaker explanatory power. Future research could involve a panel analysis of more disaggregated data in order to confirm the overall results found in this study.

In some cases, we found that the marginal spending on lottery tickets is negative for various income sources (e.g. -\$1.97 per \$100 in transfer income for California online games). Because the coefficient reflecting marginal spending is part of the formula for calculating the income elasticity of demand for lottery tickets, negative marginal spending suggests a negative income elasticity of demand which implies that lottery tickets are inferior goods. This result, along with the finding that marginal spending on lottery tickets is not the same across income sources, suggests that the income elasticity of demand for lottery tickets (and the tax burden of lottery expenditures) is not the same for all income sources. An interesting avenue for future research could explore the income elasticity of demand for lottery tickets using different income sources rather than an overall measure of income, thus shedding light on how the tax incidence of lottery ticket expenditures differs by demographic group.

Our results have several implications for state lottery research and public policy toward state lotteries. The results suggest that using an aggregate measure of income such as personal income in models of lottery demand may mask interesting differences in the marginal spending on lottery tickets. In addition, disaggregating total income into various components in an empirical model of lottery sales allows one to better discern the different effects of a certain demographic group's income and the size of the demographic group.

Forecasting state lottery revenues could be improved by incorporating components of income rather than total income in lottery forecasting models. Not only would this likely provide clearer evidence on those income components that drive lottery sales, it would also allow one to better examine the influence of more specific public policy changes, such as a policy toward changing transfer payments, on lottery sales. Disaggregating income would thus allow any forecasting model to more precisely capture the effects of policy changes on state lottery sales.

The results also have implications for the efficiency of state lottery finance and lottery earmarks to specific programs. A deadweight loss commonly results from tax and spend policies, such as transfer payments (Browning, 1976). Our finding that the marginal spending on lottery tickets out of transfer income is the largest and most significant of the income sources suggests a greater deadweight loss than if earnings income or wealth income were predominately spent on lottery tickets. This is a result of the numerous tax and spend channels a dollar must pass before it is finally spent on the earmarked program: Individuals first receive a transfer payment that includes some deadweight loss; a portion of these transfer payments are then spent on lottery tickets that have a very high effective tax and a deadweight loss (Clotfelter and Cook, 1987; Rodgers and Stuart, 1995); net lottery revenues are then spent on the targeted program, such as education. The total cost of financing social programs with state lotteries is worthy of additional study.

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Table 1: Descriptive Statistics – Per capita Income Components and Lottery Sales

	Sample Averages						
	Instant Sales	Online Sales	Total Sales	All Income	Earnings Income	Wealth Income	Transfer Income
Pooled States	$82.70	$46.61	$129.31	$28,565	$18,321 (64.1)	$4,730 (16.6)	$2,762 (10.3)
West Virginia	61.79	38.84	100.61	23,892	14,231 (59.5)	2,863 (12.0)	3,261 (13.6)
Florida	141.86	77.47	219.33	28,110	16,089 (57.2)	6,383 (22.3)	2,865 (10.2)
Iowa	43.22	22.87	66.09	28,915	18,499 (63.9)	5,226 (18.1)	2,707 (9.4)
California	48.01	39.68	87.69	32,937	21,673 (65.8)	6,020 (18.3)	2,543 (7.7)
New York	175.52	104.41	279.93	31,224	20,483 (65.6)	4,659 (14.0)	2,826 (9.1)
Illinois	63.38	35.13	98.52	27,358	17,669 (64.6)	4,289 (15.7)	2,780 (10.2)
Indiana	75.34	32.46	107.8	28,106	19,357 (68.9)	3,835 (13.7)	2,524 (9.0)

Note: Percentages (in parentheses) are sample averages, not the ratio of averages. All Income is per capita personal income. Earnings Income is per capita net earnings by place of residence. Transfer Income per capita is the sum of income maintenance benefits (less food stamps), unemployment compensation, veterans pension and disability benefits, and OASDI benefits. All data are from the Bureau of Economic Analysis, Local Area Personal Income (Tables CA05 and Tables CA35) and are available at http://www.bea.gov/regional/reis/ Income components do not sum to income in the first column. See text for details. Number of counties in each state: West Virginia (55), Florida (67), Iowa (99), California (58), New York (62), Illinois (102), Indiana (92), Pooled (535). All data are for 2005.

Table 2: Descriptive Statistics – Transfer Income Components and Shares

State	Sample Averages				
	Transfer Income	Retirement Income	Maintenance Income	Retirement % of Transfer	Maintenance % of Transfer
Pooled States	$2,762	$2,253	$509	81.3	18.7
West Virginia	3,261	2,658	603	81.5	18.5
Florida	2,865	2,401	463	82.6	17.4
Iowa	2,707	2,341	366	86.4	13.6
California	2,543	1,822	721	70.9	29.1
New York	2,826	2,199	627	77.6	22.4
Illinois	2,780	2,250	529	81.0	19.0
Indiana	2,524	2,120	404	84.1	15.9

Note: Percentages are sample averages, not the ratio of averages. Income data are in per capita terms. Transfer income is the sum of income maintenance benefits (less food stamps), unemployment compensation, veterans pension and disability benefits, and OASDI benefits. Retirement income is veterans' pension and disability benefits plus OASDI benefits. Maintenance income is unemployment compensation plus income maintenance benefits. All data are from the Bureau of Economic Analysis, Local Area Personal Income (Tables CA35) and are available at http://www.bea.gov/regional/reis/.

Table 3 – Marginal Spending on Lottery Tickets: By Income Source (Per $100 in Income)

Pooled

	All Income	Earnings Income	Wealth Income	Transfer Income
Instant Sales	-0.002	0.02	-0.05	1.72**
Online Sales	0.17**	0.19**	0.09	0.59**
Total Sales	0.17**	0.21**	0.04	2.31**

West Virginia

	All Income	Earnings Income	Wealth Income	Transfer Income
Instant Sales	-0.002	-0.13	0.21	0.05
Online Sales	0.27**	0.18	0.67**	0.28
Total Sales	0.27**	0.05	0.87	0.33

Florida

	All Income	Earnings Income	Wealth Income	Transfer Income
Instant Sales	-0.09	-0.27**	0.05	3.83
Online Sales	0.07	0.09	0.04	1.58**
Total Sales	-0.02	-0.18	0.08	5.41*

Iowa

	All Income	Earnings Income	Wealth Income	Transfer Income
Instant Sales	0.15**	0.10	0.03	3.40**
Online Sales	0.12**	0.09**	0.09	1.63**
Total Sales	0.26**	0.19*	0.12	5.04**

California

	All Income	Earnings Income	Wealth Income	Transfer Income
Instant Sales	-0.072**	-0.02	-0.18*	0.72
Online Sales	0.19	-0.01	0.55	-1.97*
Total Sales	0.12	-0.03	0.38	-1.24

New York

	All Income	Earnings Income	Wealth Income	Transfer Income
Instant Sales	0.05	0.05	0.09	5.16*
Online Sales	0.23**	0.27**	0.06	5.50**
Total Sales	0.29**	0.32	0.15	10.64**

Illinois

	All Income	Earnings Income	Wealth Income	Transfer Income
Instant Sales	0.05*	-0.12	0.65**	0.72
Online Sales	0.16**	0.17**	0.12	0.63
Total Sales	0.21**	0.04	0.77*	1.37

Indiana

	All Income	Earnings Income	Wealth Income	Transfer Income
Instant Sales	0.06	0.07	-0.10	2.05
Online Sales	0.09**	0.12**	-0.06	0.72
Total Sales	0.15**	0.19	-0.16	2.78

Note: 'All Income' is from coefficients in Column (1), (4), and (7) of Tables A1 though A8, multiplied by 100 and rounded. Other incomes are from coefficients in Column (2), (5), and (8) of Tables A1 though A8, multiplied by 100 and rounded. * denotes significance at 10 percent, ** at 5 percent or better.

Table 4: Equality Tests for Marginal Spending by Income Source
F-tests on Coefficient Equality

	H_o: Transfer = Earnings	H_o: Transfer = Wealth	H_o: Earnings = Wealth
Pooled			
Instant Sales	18.98**	20.33**	0.67
Online Sales	1.69	2.52	1.68
Total Sales	14.05**	16.11**	1.64
West Virginia			
Instant Sales	0.10	0.04	0.28
Online Sales	0.04	0.41	0.89
Total Sales	0.14	0.30	0.97
Florida			
Instant Sales	10.05**	8.65**	1.97
Online Sales	2.84*	3.08**	0.13
Total Sales	9.22**	8.46**	0.67
Iowa			
Instant Sales	7.68**	7.50**	0.08
Online Sales	10.05**	9.34**	0.00
Total Sales	9.63**	9.26**	0.04
California			
Instant Sales	0.77	1.02	0.72
Online Sales	0.94	1.42	1.65
Total Sales	0.34	0.55	0.79
New York			
Instant Sales	3.18*	3.16*	0.01
Online Sales	7.24**	7.96**	0.20
Total Sales	6.20**	6.49**	0.03
Illinois			
Instant Sales	0.34	0.02	5.55**
Online Sales	0.23	0.29	0.04
Total Sales	0.39	0.07	2.34
Indiana			
Instant Sales	1.99	2.44	0.33
Online Sales	0.82	1.43	1.54
Total Sales	2.05	2.75*	0.81

Notes: * denotes significance at 10 percent, ** at 5 percent or better. F-tests are for coefficients shown in Table 3.

Table 5 – Marginal Spending on Lottery Tickets: By Income Source and Transfer Income Source (Per $100 in Income)

	All Income	Earnings Income	Wealth Income	Retirement Income	Maintenance Income
Pooled					
Instant Sales	-0.002	0.03	-0.04	1.41**	3.18**
Online Sales	0.17**	0.19**	0.10	0.40	1.48
Total Sales	0.17**	0.22**	0.06	1.81**	4.67**
West Virginia					
Instant Sales	-0.002	-0.15	0.18	0.21	-0.82
Online Sales	0.27**	0.08	0.55	1.16*	-4.68*
Total Sales	0.27**	-0.68	0.74	1.37	-5.50
Florida					
Instant Sales	-0.09	-0.19	0.02	3.15	14.83**
Online Sales	0.07	0.12*	0.03	1.29**	6.24
Total Sales	-0.02	-0.06	0.05	4.43*	21.07**
Iowa					
Instant Sales	0.15**	0.18*	0.08	1.27	10.56**
Online Sales	0.12**	0.13**	0.12**	0.51	5.37**
Total Sales	0.26**	0.31**	0.20	1.78	15.93**
California					
Instant Sales	-0.072**	-0.02	-0.18*	0.48	0.95
Online Sales	0.19	0.10	0.51	-7.54**	3.63
Total Sales	0.12	0.08	0.33	-7.05**	4.59
New York					
Instant Sales	0.05	0.06	0.001	5.78*	2.91
Online Sales	0.23**	0.31**	-0.17	7.02**	-0.05
Total Sales	0.29**	0.37*	-0.17	12.79**	2.86
Illinois					
Instant Sales	0.05*	-0.11	0.69**	0.03	2.77
Online Sales	0.16**	0.18**	0.16	-0.18	3.04
Total Sales	0.21**	0.07	0.85*	-0.15	5.81
Indiana					
Instant Sales	0.06	0.05	-0.15	2.75*	-6.37
Online Sales	0.09*	0.12**	-0.05	0.67	0.89
Total Sales	0.15**	0.17	-0.21	3.43*	0.52

Note: 'All Income' is from Column (1), (4), and (7) of Tables A1 though A8, multiplied by 100 and rounded. Other incomes are from Column (3), (6), and (9) of Tables A1 though A8, multiplied by 100 and rounded. * denotes significance at 10 percent, ** at 5 percent or better.

Table 6: Equality Tests for Marginal Spending by Income Source
F-tests on Coefficient Equality

	H_o: Retirement = Earnings	H_o: Retirement= Wealth	H_o: Retirement = Maintenance	H_o: Maintenance = Earnings	H_o: Maintenance = Wealth
Pooled					
Instant Sales	9.21**	10.18**	2.00	8.26**	8.63**
Online Sales	0.32	0.67	1.19	2.21	2.53
Total Sales	5.88**	7.16**	2.51	7.95**	8.54**
West Virginia					
Instant Sales	0.16	0.04	0.06	0.04	0.08
Online Sales	2.23	0.56	3.25*	3.04*	3.62*
Total Sales	1.50	0.22	1.64	1.45	1.88
Florida					
Instant Sales	6.99**	6.28**	7.11**	12.34**	11.80**
Online Sales	1.70	2.04	2.54	4.08**	4.14**
Total Sales	6.29**	6.11**	7.12**	12.07**	11.74**
Iowa					
Instant Sales	0.50	0.58	5.08**	9.62**	9.66**
Online Sales	0.38	0.39	8.67**	15.31**	15.14**
Total Sales	0.54	0.61	7.01**	12.96**	12.95**
California					
Instant Sales	0.12	0.21	0.04	0.47	0.60
Online Sales	5.37**	5.97**	4.56**	1.20	0.88
Total Sales	4.31**	4.62**	4.56**	1.87	1.50
New York					
Instant Sales	3.30*	3.21*	0.24	0.27	0.30
Online Sales	10.54**	11.54**	3.33*	0.01	0.00
Total Sales	7.62**	7.91**	1.39	0.10	0.16
Illinois					
Instant Sales	0.07	0.16	0.77	1.11	0.59
Online Sales	0.11	0.10	2.46	2.52	2.61
Total Sales	0.08	0.17	1.74	2.11	1.61
Indiana					
Instant Sales	2.64	3.06*	0.66	0.01	0.04
Online Sales	0.48	0.85	0.01	0.24	0.37
Total Sales	2.31	2.89*	0.34	0.06	0.03

Notes: * denotes significance at 10 percent, ** at 5 percent or better. F-tests are for coefficients shown in Table 5.

Appendix Table A1: Pooled States, Complete Regression Results

	Instant Lottery Games			Online Lottery Games			All Lottery Games		
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	172.45** (7.57)	155.16** (6.58)	138.29** (5.06)	101.71** (5.73)	102.83** (5.71)	92.53** (4.37)	274.17** (8.97)	257.99** (8.37)	230.82** (6.00)
All Personal Income	-0.000002 (0.01)	-------	-------	0.0017*** (7.54)	-------	-------	0.0017** (4.73)	-------	-------
Earnings Income	-------	0.00023 (0.70)	0.0003 (1.37)	-------	0.002** (5.99)	0.020** (6.28)	-------	0.002** (3.94)	0.0023** (4.31)
Transfer Income	-------	0.017** (2.81)	-------	-------	0.0059** (2.09)	-------	-------	0.023** (2.88)	-------
Wealth Income	-------	-0.0005 (0.72)	-0.0004 (0.61)	-------	0.001 (1.28)	0.001 (1.33)	-------	0.0004 (0.35)	0.0006 (0.45)
Retirement Income	-------	-------	0.014** (2.08)	-------	-------	0.004 (1.22)	-------	-------	0.018** (2.18)
Maintenance Income	-------	-------	0.032 (2.54)	-------	-------	0.015 (1.21)	-------	-------	0.047** (2.39)
Unemployment Rate	0.696 (0.81)	-0.724 (0.70)	-1.52 (1.37)	3.94** (4.54)	3.79** (4.14)	3.31** (3.20)	4.64** (3.61)	3.07** (2.17)	1.78 (1.09)
Percent High School	92.98** (3.72)	77.32** (2.93)	77.77** (2.95)	57.97** (2.55)	43.08* (1.79)	43.36* (1.80)	150.94** (4.08)	120.40** (3.10)	121.12** (3.12)
Percent White	-84.91** (3.70)	-75.61** (3.38)	-59.61** (2.16)	-157.47** (7.62)	-158.14** (7.30)	-148.37** (6.44)	-242.38** (7.97)	-233.75** (7.78)	-207.99** (5.52)
Percent 65 or older	40.14 (1.08)	-134.12 (1.55)	-103.54 (1.14)	128.91** (4.76)	126.91** (2.41)	145.59** (2.90)	169.05** (3.25)	-7.21 (0.06)	42.04 (0.36)
Border Dummy	-1.24 (0.52)	-1.77 (0.77)	-1.69 (0.73)	8.99** (4.44)	8.92** (4.37)	8.96** (4.37)	7.75** (2.19)	7.14** (2.06)	7.27** (2.09)
State Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.77	0.78	0.78	0.73	0.72	0.72	0.81	0.82	0.82

Notes: absolute *t*-statistics in parentheses. * denotes significance at 10 percent, ** at 5 percent or better. Pooled sample includes all counties for West Virginia, Iowa, New York, Florida, California, Illinois, and Indiana. Number of observations = 535. See text for variable description.

Appendix Table A2: West Virginia Lottery, Complete Regression Results

	Instant Lottery Games			Online Lottery Games			All Lottery Games		
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	85.63 (0.67)	132.80 (1.05)	137.83 (1.06)	115.85* (1.71)	179.16** (2.65)	207.93** (3.68)	201.48 (1.22)	311.96* (1.87)	345.76** (2.06)
All Personal Income	-0.00002 (0.02)	-------	-------	0.0027** (3.40)	-------	-------	0.0027** (2.22)	-------	-------
Earnings Income	-------	-0.0013 (0.90)	-0.0015 (0.91)	-------	0.0018 (1.43)	0.00081 (0.74)	-------	0.00049 (0.26)	-0.00069 (0.32)
Transfer Income	-------	0.00052 (0.09)	-------	-------	0.0028 (0.85)	-------	-------	0.0033 (0.44)	-------
Wealth Income	-------	0.0021 (0.39)	0.0019 (0.34)	-------	0.0067** (2.64)	0.0055** (2.12)	-------	0.0087 (1.24)	0.0074 (1.04)
Retirement Income	-------	-------	0.0021 (0.24)	-------	-------	0.012* (1.94)	-------	-------	0.014 (1.25)
Maintenance Income	-------	-------	-0.0082 (0.82)	-------	-------	-0.047* (1.82)	-------	-------	-0.055 (1.20)
Unemployment Rate	-4.31 (1.55)	-5.69* (1.88)	-5.64* (1.83)	2.95 (1.25)	3.12 (1.15)	3.39 (1.29)	-1.36 (0.38)	-2.57 (0.64)	-2.26 (0.57)
Percent High School	47.06 (0.57)	71.83 (0.76)	64.03 (0.64)	54.92 (0.88)	75.54 (1.33)	30.85 (0.54)	101.98 (0.95)	147.38 (1.18)	94.88 (0.73)
Percent White	-68.32 (0.49)	-96.53 (0.69)	-92.51 (0.65)	-221.75** (2.75)	-274.91** (3.40)	-251.89** (3.35)	-290.07 (1.63)	-371.44** (2.02)	-344.40* (1.87)
Percent 65 or older	339.43** (2.12)	261.38 (1.18)	252.09 (1.11)	194.00* (1.95)	135.44 (0.79)	82.25 (0.54)	533.43** (2.59)	396.83 (1.36)	334.34 (1.14)
Border Dummy	-11.56* (1.89)	-10.23 (1.62)	-10.90 (1.58)	7.29** (2.01)	6.20* (1.72)	2.43 (0.72)	-4.27 (0.54)	-4.04 (0.49)	-8.47 (0.95)
Adjusted R^2	0.061	0.039	0.019	0.393	0.370	0.340	0.234	0.178	0.189

Notes: absolute *t*-statistics in parentheses. * denotes significance at 10 percent, ** at 5 percent or better. Sample is West Virginia counties. Number of observations = 55. See text for variable description.

Appendix Table A3: Florida Lottery, Complete Regression Results

	Instant Lottery Games			Online Lottery Games			All Lottery Games		
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	130.19*	164.30**	66.77	79.13	72.02	30.66	209.32*	236.32**	97.42
	(1.70)	(2.38)	(0.87)	(1.49)	(1.33)	(0.46)	(1.90)	(2.19)	(0.78)
All Personal Income	-0.00092	-------	-------	0.00074	-------	-------	-0.00018	-------	-------
	(1.13)			(1.47)			(0.17)		
Earnings Income	-------	-0.0027**	-0.0019	-------	0.00089	0.0012*	-------	-0.0018	-0.00064
		(2.08)	(1.51)		(1.29)	(1.75)		(1.03)	(0.39)
Transfer Income	-------	0.038	-------	-------	0.016**	-------	-------	0.054*	-------
		(1.61)			(2.13)			(1.80)	
Wealth Income	-------	0.00046	0.00022	-------	0.00036	0.00025	-------	0.00081	0.00047
		(0.48)	(0.22)		(0.37)	(0.30)		(0.48)	(0.31)
Retirement Income	-------	-------	0.032	-------	-------	0.013**	-------	-------	0.044*
			(1.57)			(2.23)			(1.84)
Maintenance Income	-------	-------	0.15**	-------	-------	0.062	-------	-------	0.21**
			(2.67)			(1.61)			(3.02)
Unemployment Rate	2.51	0.78	-6.92	8.35**	8.33**	5.06	10.86	9.11	-1.85
	(0.35)	(0.16)	(1.47)	(2.23)	(2.09)	(1.10)	(1.48)	(1.19)	(0.23)
Percent High School	127.58	-34.94	-96.80	-80.48	-133.19	-159.42**	47.09	-168.13	-256.22*
	(0.99)	(0.31)	(0.79)	(0.99)	(1.55)	(2.00)	(0.29)	(1.03)	(1.75)
Percent White	-48.39	-20.60	65.16	-71.40	-61.32	-24.95	-119.79	-81.92	40.20
	(0.80)	(0.42)	(0.97)	(1.64)	(1.38)	(0.41)	(1.35)	(0.98)	(0.37)
Percent 65 or older	99.02	-438.05	-258.17	160.54**	15.97	92.25	259.56**	-422.07	-165.92
	(0.98)	(1.65)	(1.00)	(3.06)	(0.14)	(1.01)	(2.19)	(1.21)	(0.54)
Border Dummy	44.26**	37.50**	36.52**	19.47*	17.45	17.04	63.72**	54.95**	53.55**
	(3.47)	(2.78)	(3.05)	(1.69)	(1.58)	(1.66)	(2.62)	(2.44)	(2.69)
Adjusted R^2	0.238	0.339	0.402	0.275	0.279	0.298	0.197	0.289	0.356

Notes: absolute *t*-statistics in parentheses. * denotes significance at 10 percent, ** at 5 percent or better. Sample is Florida counties. Number of observations = 67. See text for variable description.

Appendix Table A4: Iowa Lottery, Complete Regression Results

	Instant Lottery Games			Online Lottery Games			All Lottery Games		
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	-15.09 (0.15)	-61.90 (0.62)	-139.86 (1.36)	62.25* (1.72)	41.90 (1.16)	1.09 (0.03)	47.16 (0.36)	-20.00 (0.15)	-138.77 (1.10)
All Personal Income	0.0015** (2.06)	-------	-------	0.0012** (4.12)	-------	-------	0.0026** (2.79)	-------	-------
Earnings Income	-------	0.0010 (1.02)	0.0018* (1.77)	-------	0.00086** (2.37)	0.0013** (3.17)	-------	0.0019* (1.68)	0.0031** (2.51)
Transfer Income	-------	0.034** (2.88)	-------	-------	0.016** (2.89)	-------	-------	0.050** (2.93)	-------
Wealth Income	-------	0.00026 (0.12)	0.00084 (0.40)	-------	0.00090 (1.43)	0.0012** (2.12)	-------	0.0012 (0.63)	0.0020 (1.24)
Retirement Income	-------	-------	0.013 (0.84)	-------	-------	0.0051 (0.79)	-------	-------	0.018 (0.88)
Maintenance Income	-------	-------	0.11** (3.13)	-------	-------	0.054** (4.92)	-------	-------	0.16** (4.67)
Unemployment Rate	6.89** (2.20)	2.42 (0.69)	-0.87 (0.23)	2.30* (1.78)	0.26 (0.17)	-1.46 (1.02)	9.20** (2.23)	2.68 (0.57)	-2.33 (0.53)
Percent High School	-26.94 (0.47)	-29.00 (0.52)	-35.31 (0.64)	46.29** (2.11)	46.08** (2.06)	42.78** (2.00)	19.35 (0.26)	17.09 (0.24)	7.48 (0.11)
Percent White	-34.71 (0.33)	25.44 (0.24)	90.89 (0.85)	-109.31** (2.77)	-81.04** (2.07)	-46.78 (1.33)	-144.02 (1.03)	-55.59 (0.42)	44.11 (0.35)
Percent 65 or older	172.92** (2.39)	-173.13 (1.14)	39.27 (0.22)	25.98 (1.10)	-139.90** (2.12)	-28.74 (0.39)	198.90** (2.09)	-313.04 (1.59)	10.53 (0.05)
Border Dummy	-3.45 (0.95)	-3.30 (0.92)	-4.31 (1.23)	2.45 (1.39)	2.62 (1.53)	2.08 (1.24)	-1.00 (0.21)	-0.68 (0.14)	-2.23 (0.46)
Adjusted R^2	0.068	0.111	0.149	0.192	0.237	0.297	0.083	0.136	0.190

Notes: absolute *t*-statistics in parentheses. * denotes significance at 10 percent, ** at 5 percent or better. Sample is Iowa counties. Number of observations = 99. See text for variable description.

Appendix Table A5: California Lottery, Complete Regression Results

	Instant Lottery Games			Online Lottery Games			All Lottery Games		
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	137.96** (5.11)	111.69** (4.58)	108.78** (2.47)	-54.97 (0.56)	37.94 (0.83)	-126.18 (1.06)	82.98 (0.87)	153.63** (2.86)	-17.41 (0.14)
All Personal Income	-0.00072** (2.30)	-------	-------	0.0019 (1.39)	-------	-------	0.0012 (0.92)	-------	-------
Earnings Income	-------	-0.00021 (0.56)	-0.00016 (0.36)	-------	-0.00011 (0.18)	0.00099 (1.18)	-------	-0.00032 (0.45)	0.00083 (0.84)
Transfer Income	-------	0.0072 (0.87)	-------	-------	-0.020* (1.84)	-------	-------	-0.012 (0.80)	-------
Wealth Income	-------	-0.0018* (1.83)	-0.0018* (1.86)	-------	0.0055 (1.10)	0.0051 (1.13)	-------	0.0038 (0.81)	0.0033 (0.80)
Retirement Income	-------	-------	0.0048 (0.37)	-------	-------	-0.075** (2.41)	-------	-------	-0.071** (2.13)
Maintenance Income	-------	-------	0.0095 (0.77)	-------	-------	0.036 (0.98)	-------	-------	0.046 (1.25)
Unemployment Rate	0.20 (0.18)	-0.13 (0.12)	-0.31 (0.26)	1.87 (0.78)	2.48 (1.11)	-1.66 (1.14)	2.07 (0.89)	2.35 (0.98)	-1.96 (0.94)
Percent High School	-76.35 (0.89)	-87.85 (1.04)	-78.62 (0.75)	360.96 (1.22)	349.37 (1.31)	568.46 (1.60)	284.61 (1.03)	261.52 (1.01)	489.84 (1.50)
Percent White	-47.60** (3.49)	-33.84* (2.00)	-29.70 (1.35)	-79.83** (2.40)	-129.23* (2.00)	-30.86 (0.84)	-127.44** (3.60)	-163.07** (2.75)	-60.55 (1.25)
Percent 65 or older	-32.18 (0.34)	-120.26 (0.81)	-88.22 (0.45)	-46.31 (0.25)	177.52 (0.53)	938.51** (2.63)	-78.49 (0.39)	57.27 (0.15)	850.29* (1.86)
Border Dummy	-16.76** (3.67)	-16.84** (3.51)	-17.05** (3.63)	20.64* (1.78)	21.67 (1.66)	16.64 (1.60)	3.88 (0.33)	4.83 (0.37)	-0.41 (0.04)
Adjusted R^2	0.390	0.382	0.370	0.158	0.145	0.203	0.074	0.044	0.109

Notes: absolute *t*-statistics in parentheses. * denotes significance at 10 percent, ** at 5 percent or better. Sample is California counties. Number of observations = 58. See text for variable description.

Appendix Table A6: New York Lottery, Complete Regression Results

	Instant Lottery Games			Online Lottery Games			All Lottery Games		
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	61.74 (0.90)	73.32 (1.07)	89.63 (1.17)	225.48** (4.70)	241.67** (5.22)	281.89** (5.60)	287.22** (2.81)	314.99** (3.18)	371.53** (3.39)
All Personal Income	0.00053 (1.01)	-------	-------	0.0023** (6.43)	-------	-------	0.0029** (3.70)	-------	-------
Earnings Income	-------	0.00046 (0.34)	0.00062 (0.45)	-------	0.0027** (3.04)	0.0031** (3.46)	-------	0.0032 (1.66)	0.0038* (1.90)
Transfer Income	-------	0.052* (1.81)	-------	-------	0.055** (2.85)	-------	-------	0.11** (2.58)	-------
Wealth Income	-------	0.00094 (0.16)	0.000014 (0.00)	-------	0.00059 (0.15)	-0.0017 (0.42)	-------	0.0015 (0.18)	-0.0017 (0.19)
Retirement Income	-------	-------	0.058* (1.84)	-------	-------	0.070** (3.40)	-------	-------	0.13** (2.85)
Maintenance Income	-------	-------	0.029 (0.54)	-------	-------	-0.00050 (0.01)	-------	-------	0.029 (0.37)
Unemployment Rate	4.25 (0.56)	-2.73 (0.32)	0.013 (0.00)	-3.45 (0.65)	-10.48* (1.81)	-3.71 (0.55)	0.80 (0.07)	-13.22 (1.07)	-3.70 (0.25)
Percent High School	-98.44 (0.64)	-32.68 (0.20)	-42.98 (0.25)	149.30 (1.39)	197.23* (1.75)	171.84 (1.55)	50.86 (0.22)	164.54 (0.68)	128.86 (0.53)
Percent White	19.26 (0.31)	-21.36 (0.32)	-49.70 (0.56)	-299.67** (6.84)	-349.32** (7.80)	-419.19** (7.20)	-280.41** (3.01)	-370.68** (3.87)	-468.90** (3.70)
Percent 65 or older	630.99** (2.80)	-120.22 (0.22)	-119.50 (0.22)	275.72* (1.76)	-391.75 (1.07)	-389.96 (1.09)	906.71** (2.71)	-511.97 (0.65)	-509.45 (0.65)
Border Dummy	9.42 (1.10)	8.55 (1.00)	9.26 (1.06)	12.35** (2.08)	11.31* (1.95)	13.07** (2.27)	21.77* (1.72)	19.85 (1.60)	22.33* (1.78)
Adjusted R^2	0.087	0.107	0.094	0.783	0.800	0.809	0.500	0.535	0.538

Notes: absolute *t*-statistics in parentheses. * denotes significance at 10 percent, ** at 5 percent or better. Sample is New York counties. Number of observations = 62. See text for variable description.

Appendix Table A7: Illinois Lottery, Complete Regression Results

	Instant Lottery Games			Online Lottery Games			All Lottery Games		
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	69.71** (2.15)	87.22** (2.82)	60.07 (1.29)	96.17** (3.21)	96.64** (3.42)	64.75** (2.03)	165.88** (3.16)	183.87** (3.73)	124.82* (1.85)
All Personal Income	-0.0005* (1.78)	-------	-------	0.0016** (4.66)	-------	-------	0.0022** (4.52)	-------	-------
Earnings Income	-------	-0.0013 (1.50)	-0.0011 (1.35)	-------	0.0017** (2.94)	0.0018** (3.27)	-------	0.0004 (0.35)	0.0007 (0.56)
Transfer Income	-------	0.0073 (0.46)	-------	-------	0.0064 (2.94)	-------	-------	0.014 (0.60)	-------
Wealth Income	-------	0.0065** (2.33)	0.0069** (2.35)	-------	0.0012 (0.62)	0.0017 (0.76)	-------	0.0079* (1.79)	0.0085* (1.85)
Retirement Income	-------	-------	0.0003 (0.02)	-------	-------	-0.0018 (0.15)	-------	-------	-0.0015 (0.06)
Maintenance Income	-------	-------	0.028 (0.98)	-------	-------	0.030 (1.29)	-------	-------	0.058 (1.25)
Unemployment Rate	2.23 (1.07)	1.83 (0.66)	1.02 (0.34)	4.39** (3.15)	4.02** (2.21)	3.06 (1.61)	6.62** (2.40)	5.85 (1.52)	4.08 (0.99)
Percent High School	216.05** (4.55)	242.19** (5.50)	250.85** (5.47)	147.15** (4.68)	141.38** (4.92)	151.55** (4.95)	363.20** (5.26)	383.58** (6.12)	402.39** (6.14)
Percent White	-105.51** (2.83)	-103.43** (2.79)	-74.37 (1.47)	-193.81** (5.70)	-192.94** (5.67)	-158.81** (4.86)	-299.32** (4.55)	-296.38** (4.55)	-233.18** (3.11)
Percent 65 or older	-66.24 (0.93)	-301.63 (1.09)	-285.62 (1.03)	-10.04 (0.19)	-43.79 (0.26)	-25.00 (0.15)	-76.28 (0.71)	-345.42 (0.89)	-310.62 (0.80)
Border Dummy	-1.89 (0.50)	-3.12 (0.81)	-2.74 (0.71)	3.25 (1.21)	3.07 (1.08)	3.51 (1.22)	1.35 (0.25)	-0.049 (0.01)	0.766 (0.14)
Adjusted R^2	0.17	0.20	0.20	0.63	0.62	0.63	0.41	0.41	0.42

Notes: absolute *t*-statistics in parentheses. * denotes significance at 10 percent, ** at 5 percent or better. Sample is Illinois counties. Number of observations = 102. See text for variable description.

Appendix Table A8: Indiana Lottery, Complete Regression Results

	Instant Lottery Games			Online Lottery Games			All Lottery Games		
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	90.03*	88.25*	111.78**	83.51**	80.95**	79.31**	173.53**	169.20**	191.09**
	(1.72)	(1.76)	(2.14)	(3.92)	(3.92)	(3.43)	(3.07)	(3.21)	(3.34)
All Personal Income	0.0006	-------	-------	0.0009**	-------	-------	0.0015**	-------	-------
	(1.18)			(4.09)			(2.19)		
Earnings Income	-------	0.0007	0.0006	-------	0.0012**	0.0012**	-------	0.0019	0.0018
		(0.82)	(0.59)		(2.51)	(2.41)		(1.62)	(1.41)
Transfer Income	-------	0.021	-------	-------	0.0072	-------	-------	0.027	-------
		(1.45)			(1.36)			(1.55)	
Wealth Income	-------	-0.001	-0.0015	-------	-0.0006	-0.0006	-------	-0.0016	-0.0021
		(0.39)	(0.60)		(0.46)	(0.46)		(0.44)	(0.58)
Retirement Income	-------	-------	0.028*	-------	-------	0.0068	-------	-------	0.034*
			(1.96)			(1.09)			(1.93)
Maintenance Income	-------	-------	-0.0038	-------	-------	0.0089	-------	-------	0.0052
			(0.11)			(0.66)			(0.11)
Unemployment Rate	5.92**	2.87	3.12	1.94*	1.03	1.10	7.86**	3.91	4.13
	(2.82)	(0.96)	(1.01)	(1.87)	(0.78)	(0.75)	(2.85)	(1.03)	(1.06)
Percent High School	52.80	35.16	28.71	76.82**	63.37**	63.81**	129.63**	98.53*	92.52*
	(1.12)	(0.73)	(0.59)	(4.54)	(3.39)	(3.50)	(2.51)	(1.75)	(1.65)
Percent White	-108.47**	-95.98*	-111.98*	-133.23**	-129.24**	-128.12**	-241.70**	-225.22**	-240.11**
	(1.99)	(1.72)	(0.43)	(7.24)	(7.32)	(6.74)	(4.70)	(4.23)	(4.09)
Percent 65 or older	157.63	-61.61	-111.02	60.11	25.04	28.48	217.75	-36.57	-82.54
	(1.15)	(0.23)	(0.43)	(1.00)	(0.23)	(0.25)	(1.23)	(0.11)	(0.24)
Border Dummy	-11.16**	-11.77**	-11.48**	4.67**	4.45**	4.42**	-6.49	-7.32	-7.05
	(2.93)	(3.02)	(2.89)	(2.19)	(2.09)	(1.09)	(1.27)	(1.41)	(1.32)
Adjusted R^2	0.20	0.20	0.19	0.38	0.38	0.38	0.25	0.26	0.25

Notes: absolute *t*-statistics in parentheses. * denotes significance at 10 percent, ** at 5 percent or better. Sample is Indiana counties. Number of observations = 92. See text for variable description.