Economics Bulletin

Volume 45, Issue 3

Has the rise of legal sports betting reduced lottery revenues? Evidence from New York

Tracy Buchman
University of Wisconsin Whitewater

Russell Kashian
University of Wisconsin Whitewater

Robert Drago
Precision Numerics

Abstract

This paper examines the relationship between the legalization of mobile sports betting and state lottery ticket sales utilizing weekly sales data from the state of New York. This paper finds a statistically significant decline in lottery ticket sales compared with expectations after the introduction of mobile sports betting in the state on January 1, 2022. Every $100 in legal sports bets made results in a decline in lottery ticket sales of $3.13. Alternatively, weekly lottery ticket sales fell by $11.5 million per week following the introduction of mobile sports betting. This still results in an increase in total gambling revenue collected in New York, but in jurisdictions with lower sports betting tax rates, a similar finding would result in a net decline in total gambling revenues from the introduction of sports betting.

The authors report there are no competing interests to declare.
Citation: Robert Baumann, (2025) "Has the rise of legal sports betting reduced lottery revenues? Evidence from New York", *Economics Bulletin*, Volume 45, Issue 3, pages 1341-1353
Contact: Robert Baumann - rbaumann@holycross.edu.
Submitted: February 01, 2025. **Published:** September 30, 2025.

1 Introduction

In May 2018, the US Supreme Court overturned the Professional and Amateur Sports Protection Act which made sports betting illegal outside of the state of Nevada (along with limited sports betting through the state lotteries of Oregon, Delaware, and Montana). Since this decision states have quickly legalized sports betting with 38 states and the District of Columbia offering some form of legal sports gambling as of January 2025.

A primary impetus for sports betting legalization has been a desire to raise state revenues. Gamblers placed over $120 billion in legal sports wagers generating over $2 billion in direct state tax revenues in 2023 and $160 billion in legal sports wagers generating nearly $3 billion in tax revenues in 2024 (Ramsey, 2025). These figures appear to be growing in 2025.

One significant public finance concern about expanding gambling access is that the introduction of new gambling products may not lead to an increase in overall gambling activity but instead might result in gamblers substituting from one betting product to another. This is commonly referred to as "cannibalization" (Goss and Miller, 2021). Numerous papers have examined cannibalization within and between different gambling markets. Grote and Matheson (2006; 2007) find that state lottery associations that join multi-state lotteries experience a decline in their own lotto sales, but that overall lottery ticket sales increase with the introduction of new lotto games. Chagas (2023) finds similar evidence of product cannibalization in the Portuguese lottery. Combs, Crowley, and Spry (2013) find that lottery promotions designed to spur sales of one type of lottery product can result in increased sales of complementary lottery games.

With respect to casino gaming, Gallagher (2014) and Condliffe (2012) both find significant levels of intra-industry cannibalization with the introduction of new casinos as newly opened facilities divert gamblers away from existing casinos.

Other papers examine the extent of cannibalization between fundamentally different gambling products that may serve different markets with a more limited substitution effect. Elliott and Navin (2002) study the relationship between lotteries, casinos, and pari-mutuel betting. They find that the presence of casinos and racetracks reduces lottery demand. In the case of casinos, the increase in casino revenues outweighs the losses to state lotteries, but with respect to racetracks, lost lottery revenues exceed any additional receipts from racetrack betting. Walker and Jackson (2008) find mixed evidence of substitution effects in their analysis of the inter-industry relationships between casinos, lotteries, horse racing, and greyhound racing.

In the work most closely related to this paper, Humphreys (2021) shows that the introduction of sports betting in West Virginia generated $2.6 million in new state tax revenue from sports betting but was associated with significant decline in spending on video lottery terminals (VLTs) in casinos. Because the tax rate on VLTs was much higher than that levied on sports betting, the introduction of sports betting led to a $44.8 million decline in combined tax revenues from the two sources.

This paper extends the work of Humphreys (2021) by examining the effect of the introduction of sports betting on traditional lottery ticket sales. The video lottery terminals

analyzed by Humphreys are actually more akin to slot machines than what one would normally think of as lottery tickets and were only available in a handful of casinos throughout West Virginia. In addition, West Virigina is one of only 8 states that offers VLT betting. By contrast, traditional lottery tickets are sold at over 200,000 retailers in 45 states, and with $104 billion in total sales in 2023, traditional lottery ticket sales comprise 93% of the total revenues and an even larger proportion of government tax revenue for state lottery associations nationwide (La Fleur's, 2024). Therefore, an understanding of how legalized sports betting affects this much larger gambling market has important public policy implications.

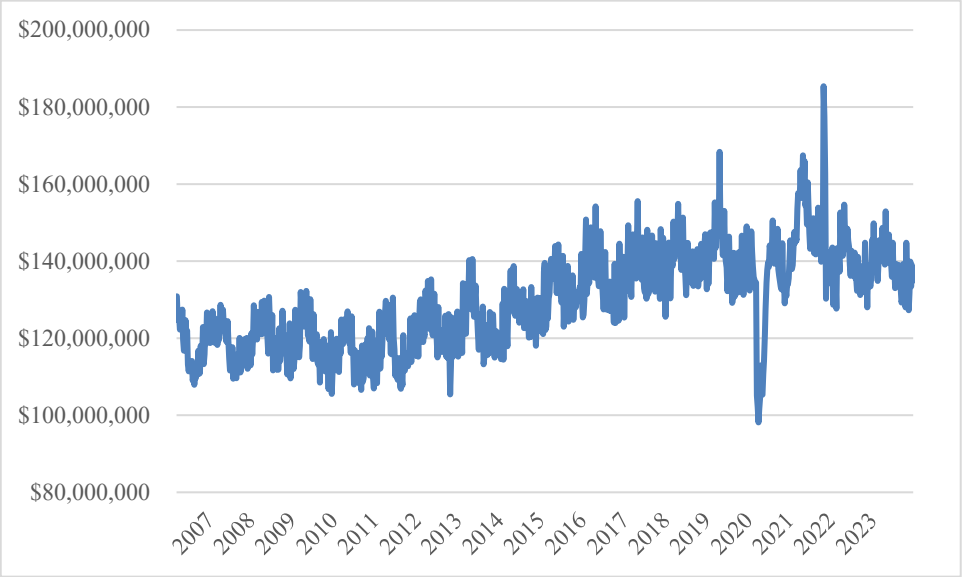
2 Data and Model

This paper examines lottery sales in conjunction with the introduction of sports betting in New York state. New York first legalized in-person sports betting at casinos in July 2019. The state then authorized online sports betting through mobile devices beginning on January 1, 2022, leading to a 70-fold increase in legal sports betting activity in the state. Since 2022, over 98% of sports betting in New York has been via online betting apps.

New York was chosen for several reasons. First, New York is the single largest sports betting market in the US with New York bettors having placed nearly $60 billion in sports wagers since legalization in 2019. New York also generates far more state government revenue from sports gaming than any other state. Roughly one-third of all sports gambling tax revenue in 2024 nationwide was earned in New York.

Most importantly, however, New York provides a publicly available data set that is unique among states. This study utilizes weekly data on mobile sports betting handles and state lottery ticket sales by type of game from April 1, 2006 through December 31, 2023 available from the New York State Gaming Commission (www.gaming.ny.gov/). No other state with legal sports gambling offers weekly lottery data broken down by game type. The availability of lottery revenue by type of game is crucial because the average takeout (tax) rate varies by game, and the weekly sales for the two national lotto games, Powerball and Mega Millions, can fluctuate by over 2500% due to variations in the size of their jackpots introducing significant noise into the data. Figure 1 illustrates the weekly lottery sales data, excluding Powerball and Mega-Millions sales, over the sample. This figure shows the seasonality of lottery sales as well as the impact of the COVID-19 pandemic. The upward spike in late 2021 is due to a one-time change in accounting practices that temporarily increased reported instant game sales by roughly 50%.

Figure 1 – Lottery Sales Data in New York



We estimate the following model for total weekly lottery ticket sales:

$$y_t = \beta_0 + \beta_1(Acct_t) + \beta_2(COVID_t) + \beta_3(Unemp_t) + \beta_4(PI_t) + \beta_5(z_t) + \alpha_m + \tau_t + \varepsilon_t$$

where *y* is the total weekly state lottery revenue (in nominal dollars) including sales of scratch-off tickets and several low-stakes games with drawings but excluding Powerball, Mega-Millions, and video lottery terminal sales. *Acct* is a dummy variable for an accounting change that occurred for three weeks in November 2021 which artificially increased reported instant game sales. *COVID* is a dummy variable for 12 weeks between April and June 2020 when lottery ticket sales in New York were depressed due to widespread restrictions on commercial activity due to the pandemic. The 12-week period was determined through visual inspection of the data. *Unemp* is the monthly state unemployment rate, and *PI* is the quarterly nominal total personal income for the state which are included to account for the effects of local economic conditions, population size, and price levels on lottery sales. α_m is the monthly impact on lottery sales, which is included to account for seasonality seen in Figure 1. τ_t is a time trend variable, which is included because the augmented Dickey-Fuller and Phillips-Perron testing (presented in the Appendix) shows that lottery sales are trend stationary. Finally, ε_t is an error term.

Two different models for the impact of sports betting on lottery sales are estimated. In model 1, *z* is a dummy variable that takes a value of 0 in all periods prior to January 1, 2022 and 1 in all periods after. Model 2 includes the weekly dollar value of total sports bets placed (known as the "handle") in the place of the sports gambling dummy. Table I shows summary statistics for these data.

Table I - Summary Statistics

Variable	Obs.	Mean	St. Dev.	Min.	Max.
Weekly lottery ticket revenue (in millions of dollars)	927	129.1	12.22	98.16	185.42
Accounting change	927	0.0032	0.0568	0	1
COVID	927	0.0129	0.113	0	1
State unemployment rate (%)	927	6.17	2.21	3.74	16.7
State personal income (in trillions of dollars)	927	1.163	0.2233	0.831	1.583
Post-mobile dummy	927	0.111	0.314	0	1
Sports handle (in millions of dollars)	927	37.57	110.7	0	572.6

3 Estimation Results

The two models for the impact of sports betting on lottery sales are estimated using ordinary least squares with robust standard errors as shown in Table II. All control variables are statistically significant and of the expected sign. Increases in nominal personal income, which reflect increases in population and nominal purchasing power, result in higher lottery sales while increases in the unemployment rate reduce lottery ticket purchases.[1] COVID reduced lottery ticket purchases by roughly $30 million per week in late March through early June.

We find that weekly lottery sales (excluding the two large, national jackpot games as previously noted) fell by an estimated $11.476 million per week following the introduction of mobile sports gambling (model 1). Under model 2 we estimate that for every $100 in mobile sports handle, sales of lottery tickets fell by roughly $3.11.

[1] Contrary to popular belief, lottery tickets are a normal good. However, the income elasticity of demand for most lottery products, while positive, is significantly below 1. Thus, lottery tickets tend to be a highly regressive form of taxation but not an inferior good. See Combs, Kim, and Spry (2008).

Table II - Least Squares Estimation Results

Variable	Model 1	Model 2
Post-mobile sports betting dummy	-11,415,770*** ($p < 0.001$)	-
Post-mobile sports betting handle	-	-0.0311*** ($p < 0.0001$)
Unemployment rate	-996,705*** ($p < 0.001$)	-952,478*** ($p < 0.001$)
Personal income level	45.99*** ($p < 0.001$)	45.91*** ($p < 0.001$)
Accounting change	32,175,849*** ($p < 0.001$)	32,180,745*** ($p < 0.001$)
COVID	-30,149,383*** ($p < 0.001$)	-30,230,560*** ($p < 0.001$)
Monthly fixed effects	Yes	Yes
Time Trend	Yes	Yes
Observations	927	927
Adj. R-squared	0.8115	0.8089

*** significant at 1% level; ** significant at 5% level; * significant at 10% level

Table III re-estimates the model using a log-linear form. These results show that mobile sports gambling decreases weekly lottery sales by roughly 8.77%. This is consistent with the estimate in model 1, which found that mobile sports gambling decreases weekly lottery sales by about $11.5 million, which is roughly 8.89% of the sample mean. Model 4 uses the sports betting handle instead of the dummy variable, and again finds a negative and statistically significant impact on lottery sales. The other controls have the same signs, statistical fit, and economic magnitude as the results in Table II. For the overall fit, the adjusted *R*-squared levels are similar between Tables II and III, which suggests this model could be estimated in linear or log-linear form.

Table III - Least Squares Estimation Results

Variable	Model 3	Model 4
Post-mobile sports betting dummy	-0.0866*** ($p < 0.001$)	-
Post-mobile sports betting handle	-	-0.0000000002*** ($p < 0.0001$)
Unemployment rate	-0.0082*** ($p < 0.001$)	-0.0078*** ($p < 0.001$)
Personal income level	0.0000003*** ($p < 0.001$)	0.0000003*** ($p < 0.001$)
Accounting change	0.2019*** ($p < 0.001$)	0.2020*** ($p < 0.001$)
COVID	-0.2365*** ($p < 0.001$)	-0.2371*** ($p < 0.001$)
Monthly fixed effects	Yes	Yes
Time Trend	Yes	Yes
Observations	927	927
Adj. R-squared	0.8099	0.8073

*** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Alternative specifications addressing the stationarity of the control variables and the impact of autocorrelation across time arrive at similar estimates for the effect of mobile sports betting on lottery sales. Models that include shorter pre-legalization time frames also result in similar effects of legalization on lottery sales. These robustness checks are available in the Appendix or from the authors upon request.

4 Policy Implications

From a public finance standpoint, in 2022 the weighted mix of lottery tickets examined in the models averaged a 25.1% operating income defined as lottery ticket sales less prizes, retail commissions, fees, and instant game direct expenses (New York State Lottery, 2023). This figure was 25.5% in 2023. Using the least square results for model 1, this implies an annual reduction in net state lottery revenues of $151.4 million. Over the same time period the state averaged

$778.3 million per year in mobile sports gambling tax revenue leaving New York's overall annual gambling tax collections $626.9 million higher under model 1.

Turning to the estimates utilizing sports gambling handle, in New York state in 2022 and 2023, every $100 in sports gambling handle resulted in $8.63 in net gambling revenue (equal to total wagers made minus prizes paid to winners). At the state's statutory tax rate of 51% of net gambling revenue, this resulted in $4.40 of tax revenue to the state. In contrast, the $3.13 in foregone lottery ticket sales in model 2 would have been expected to generate $0.79 in net revenue to the state per $100 in sports wagers made. The losses in net lottery ticket revenue would total roughly $140 million in total annually. Again, the introduction of sports gambling induced a significant cannibalization effect, but not one large enough to reduce overall gambling revenue in New York.

While New York state appears to have clearly benefited financially from the introduction of sports gambling, it is crucially important to note that at 51%, New York's mobile sports betting tax rate is the highest in the country. Table III shows the net impact of sport gambling on total annual gaming revenue at a variety of potential tax rates under Model 1 assuming lowering the tax would not affect total sport gambling handle. Baumann, Matheson, and Marrinan (2023) show that the tax rate on mobile sports gambling has no effect on sports gambling handle in their state-by-state examination of sports gambling handle in the US.

As shown in Table IV, at the median state tax rate on mobile sports betting of 10%, the reduction in lottery revenue observed in New York would have almost completely eliminated any revenue generated by mobile sports betting, and at the 5% tax rate levied in Michigan, total gaming revenues would have actually declined significantly.

Table IV - Net revenues gains (losses) from sport gambling at hypothetical tax rates ($ millions)

Tax rate	Sports gambling revenue gain	Lottery revenue loss	Net impact
51% - current NY tax rate	$778.3	$151.4	$626.9
13% - NJ tax rate	$198.4	$151.4	$47.0
10% - nationwide median tax rate	$152.6	$151.4	$1.2
5% - MI tax rate	$75.5	$151.4	-$75.9

Overall, the results in this paper suggest that states should carefully consider the effects on other gambling products when considering the legalization of and the appropriate tax rates for mobile sports betting. States shouldn't necessarily bet on higher total gambling revenues with the legalization of sports wagering.

References

Baumann, R., V. Matheson, and L. Marrinan (2023) "What Makes Sports Gambling a Good Bet? The Determinants of State Sports Betting Revenues" working paper.

Chagas, B. (2023) "Product cannibalization: a case study" working paper.

Combs, K., J. Crowley, and J. Spry (2014) "The effect of New Jersey lottery promotions on consumer demand and state profits" *Eastern Economic Journal* **40(4)**, 326-348.

Combs, K. L., J. Kim, and J. A. Spry (2008) "The relative regressivity of seven lottery games" *Applied Economics* **40(1)**, 35-39.

Condliffe, S. (2012) "Pennsylvania casinos' cannibalization of regional gambling revenues" *UNLV Gaming Research & Review Journal* **16(1)**, 45-58.

Dickey, D. A. and W. A. Fuller (1979) "Distribution of the Estimators for Autoregressive Time Series with a Unit Root" *Journal of the American Statistical Association* **74**, 427-431.

Dickey, D. A. and W. A. Fuller (1981) "Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root" *Econometrica* **4(9)**, 1057-1072.

Elliott, D. S. and J. C. Navin (2002) "Has riverboat gambling reduced state lottery revenue?" *Public Finance Review* **30(3)**, 235-247.

Gallagher, R. M. (2014) "An Examination of Cannibalization Effects within the Riverboat Gaming Industry: The Case of Illinois-Area Casinos" *Growth and Change* **45(1)**, 41-59.

Goss, E., and P. Miller (2021) "Sports Betting's Impact on Casino Gambling: Cannibalization or Expansion?" *University of Illinois Legal Review* **2021(5)**, 1731-1741.

Grote, K. R., and V. A. Matheson (2006) "Dueling Jackpots: Are Competing Lotto Games Complements or Substitutes?" *Atlantic Economic Journal* **34**, 85-100.

Grote, K. R. and V. A. Matheson (2007) "Gamblers' Love for Variety and Substitution among Lotto Games" *The Journal of Gambling Business and Economics* **1(2)**, 85-99.

Humphreys, B. R. (2021) "Legalized sports betting, VLT gambling, and state gambling revenues: Evidence from West Virginia" *Eastern Economic Journal* **47(1)**, 9-28.

LaFleur's (2024) *La Fleur's 2024 Fast Facts* https://lafleurs.com/product/fast-facts/.

New York State Lottery (2023) "Financial Statements and Supplementary Information Years Ended March 31, 2023 and 2022" https://edit.nylottery.ny.gov/sites/default/files/2023-07/final_New%20York%20State%20Lottery_FS_2023.pdf.

Ng, S. and P. Perron (1995) "Unit Root Tests in ARMA Models with Data-DependentMethods for the Selection of the Truncation Lag" *Journal of the American Statistical Association* **90**, 268-191.

Phillips, P. C. B. and P. Perron (1988) "Testing for Unit Root in Time Series Regression" *Biometrika* **75**, 335-346.

Ramsey, E. (2025) "US Sports Betting Revenue & Handle" *Legal Sports Report* https://www.legalsportsreport.com/sports-betting/revenue/, posted January 17.

Schwert, G. W. (1989) "Tests for Unit Roots: A Monte Carlo Investigation." *Journal of Business and Economic Statistics* **2**, 147-159.

Walker, D. M. and J. D. Jackson (2008) "Do US gambling industries cannibalize each other?" *Public Finance Review*, **36(3)**, 308-333.

Appendix

In this appendix we turn to robustness checks to verify the connection between online sports gambling and lottery sales. Because the estimation model uses spending and income variables over nearly two decades, we test whether these controls are stationary using two standard procedures: the augmented version of the Dickey-Fuller test described in Dickey and Fuller (1979 and 1981) and a second test from Phillips and Perron (1988). Both tests require specification of a lag structure, and we use a technique in Ng and Perron (1995) that begins with a predetermined maximum lag amount using a formula from Schwert (1989). Table A-I presents these results. Note that the null hypothesis in both tests is a unit root, which translates to a non-stationary outcome. For the dependent variable, we find mixed evidence without a trend correction but stationary outcomes if a trend variable is included. The results we report in the main body of the paper all include a time trend, so we can be confident of the stationarity of the dependent variable in our main results.

As for as the independent variables, state personal income requires more than a trend correction, because with or without the trend the state personal income level is non-stationary. However, the percent change of income is stationary even without a trend. Finally, we test for stationarity in the sports handle, though we only use the non-zero portion of the sample after online betting was legalized in January 2022. The tests show this variable is stationary.

Table A-I - Stationary Testing

	Augmented Dickey-Fuller	Phillips-Perron	Stationary? (using 5% threshold)
Weekly lottery ticket revenue, no trend	-2.46 ($p = 0.125$) lags = 19	-10.8 ($p < 0.0001$) lags = 19	Unclear
Weekly lottery ticket revenue, with trend	-4.65 ($p = 0.0008$) lags = 19	-18.3 ($p < 0.0001$) lags = 19	Yes
State personal income, no trend	0.504 ($p = 0.985$) lags = 13	0.113 ($p = 0.967$) lags = 13	No
State personal income, with trend	-2.32 ($p = 0.424$) lags = 13	-3.28 ($p = 0.070$) lags = 13	No
Percent change state personal income,	-11.3 ($p < 0.0001$)	-30.8 ($p < 0.0001$)	Yes

no trend	lags = 12	lags = 12	
Sports handle (starting in 2022), no trend	-5.20 ($p < 0.0001$) lags = 8	-4.89 ($p < 0.0001$) lags = 8	Yes

Given the results on state personal income, we modify the estimation from Table II by replacing the level of personal income with the percent change from the previous week. This latter addition lowers the sample size by one, leaving 926 weeks of data. Table A-II presents the results of these estimations. The marginal impacts of online sports betting are largely similar to Table II. We estimate that weekly lottery sales fell by roughly $9.876 million per week following the introduction of mobile sports gambling (model 3). Alternatively, model 4 finds that for every $100 in mobile sports handle, sales of lottery tickets fell by $2.68. We report the results with state personal income in levels rather than as a percent change as our main results despite the stationary problem with state personal income level because the model in levels exhibits a better model fit as measured by adjusted R-squared. However, in both specifications, the effect of the introduction on sports betting on lottery sales is quite similar.

Table A-II - Least Squares Estimation Results

Variable	Model 1-A	Model 2-A
Post-mobile sports betting dummy	-9,876,259*** ($p < 0.0001$)	
Post-mobile sports betting handle		-0.0268*** ($p < 0.0001$)
Unemployment rate	-1,107,016*** ($p < 0.0001$)	-1,066,944*** ($p < 0.0001$)
Percent change in state personal income	-227,463 ($p = 0.405$)	-240,018 ($p = 0.383$)
Promotion	34,586,409*** ($p < 0.0001$)	34,609,385*** ($p < 0.0001$)
COVID	-25,677,259*** ($p < 0.0001$)	-25,744,774*** ($p < 0.0001$)
Time Trend	Yes	Yes
Monthly fixed effects	Yes	Yes

Observations	926	926
r squared	0.7933	0.7908

*** significant at 1% level; ** significant at 5% level; * significant at 10% level.

As an additional robustness check we re-estimate the models from Table II using ARIMA. While the least squares results show that lottery sales fluctuate across several variables, ARIMA modeling incorporates the impact of autocorrelation across time on the level of lottery sales. We begin by using a Box-Jenkins approach to determine the optimal AR and MA structure, which is a trial-and-error technique that searches for the best fit as determined by the Akaike information criterion or the Bayesian information criterion. Table A-III presents the best fit outcomes of this process.

ARIMA modeling estimates that mobile sport gambling decreased lottery sales by an estimated $8.538 million per week once it was legalized (model 3-A). Alternatively, model 4-A shows that each $100 in mobile sports betting lowers lottery ticket sales by $1.97. These estimates are similar to the previous findings, which indicates that the empirical model is robust to time series modeling of the autocorrelations in weekly lottery sales.

Table A-III - ARIMA Modeling Results

Variable	**Model 3-A**	**Model 4-A**
Post-mobile sports betting dummy	-8,538,863*** ($p < 0.0001$)	
Post-mobile sports betting handle		-0.0197*** ($p < 0.0001$)
Unemployment rate	-1,309,100*** ($p < 0.0001$)	-1,255,617*** ($p < 0.0001$)
Percent change in state personal income	-92,702 ($p = 0.706$)	-91,235 ($p = 0.706$)
Promotion	36,181,929*** ($p < 0.0001$)	36,219,677*** ($p < 0.0001$)
COVID	-13,972,721*** ($p < 0.0001$)	-13,790,060*** ($p < 0.0001$)
Trend	37,303*** ($p < 0.0001$)	36,157*** ($p < 0.0001$)
Monthly fixed effects	Yes	Yes

AR terms	1, 2, 3, 4, and 10	1, 2, 3, 4, and 10

*** significant at 1% level; ** significant at 5% level; * significant at 10% level.