DRAIN OR DRAW? A PANEL STUDY OF THE IMPACT OF ILLINOIS VIDEO GAMING ON LOCAL TAXABLE RETAIL SALES

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The implementation of the Illinois Video Gaming Act of 2009 has changed the landscape of Illinois, bringing more than 33,000 new "slot-style" machines at almost 7,200 individual locations as of December 2019. Municipalities have a choice to adopt video gaming locally, a decision potentially driven by cost-benefit analysis. Municipal leaders might consider the effect of video gaming on neighboring businesses. Literature suggests a theory of economic substitution could displace dollars lost to gaming from other retail purchases. In this fixed-effect panel analysis, a positive relationship between gaming expenditures and retail sales is demonstrated while controlling for population, consumer price index, and countywide gross domestic product. While the explanatory power of the panel regression indicates the influence of omitted variables, the analysis suggests economic retail growth of nearly $6 for every $1 lost to video gaming. The hypothesis of economic substitution is rejected.

Illinois just celebrated the 10-year anniversary of the implementation of the Illinois Video Gaming Act, with the first video gaming terminals (VGT) operative in September 2012. The Act represents an immense change in both the Illinois and national landscape, with Illinois now occupying the largest collection of gaming locations in the United States, even surpassing Nevada (Ciciora, 2016; Grotto et al., 2019). After serving as a local mayor in the downstate community of Troy, Illinois, during the rollout of the gaming law, I often reflect on my community's decision to locally adopt a video gaming policy. Certainly, municipal leaders consider conflicting values over personal freedoms, effects on local economies, and negative impacts stemming from gambling addiction when considering municipal adoption of expanded gaming.

This article focuses on the second of these considerations: the impact of VGTs within local economies. Using quantitative methodology, the impact of dollars lost within VGTs is evaluated against dollars spent on retail goods within individual municipalities. A framework of economic substitution is used to explore the research question: Is there a negative relationship between net wagering of Illinois video gaming activity and local retail sales activity within a

municipality? In practice: Does $1 of net wager lost in a video gaming machine remove $1 (or a penny in local municipal sales tax) from the local retail sales market?

As with any cost-benefit ratio decision by a local municipality, municipal leaders often lack necessary information about the potential impacts of the adoption of controversial new policy innovations (O'Toole, 1995, 1997). Local video gaming represents just one of these types of policies (Sonneveld, 2013). Since the passage of the Illinois Video Gaming Act (230 ILCS 40), the Illinois General Assembly has further expanded gaming through the 2015 passage of the Raffles and Poker Runs Act (230 ILCS 15) and the 2019 passage of the Sports Wagering Act (230 ILCS 45), the first of which includes a local adoption component. This article provides guidance to state lawmakers and local municipal leaders about the real impact of one gaming policy innovation on local economies. However, it is important to recognize the impact on local economies represents just one aspect of the cost-benefit ratio of the gaming expansion equation (Grinols & Mustard, 2006). With state lawmakers considering another future gaming expansion — this time, potentially moving gaming to the Internet — this research helps to explain the effects of previous gaming expansion (Weldon, 2021).

BACKGROUND

The Illinois General Assembly expanded gaming in 2009 through the passage of the Illinois Video Gaming Act. As part of a larger effort to fund $31 billion in bonds to rebuild roads within the state, the new law expanded the geographic footprint of gambling from destination-style casinos to convenience gambling at local bars, restaurants, truck stops, and fraternal and veterans' organizations (Grotto et al., 2019).

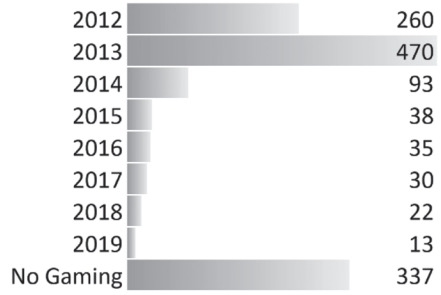
After a rocky three-year legal and regulatory state rollout, almost 75% of Illinois municipalities have collected local gaming taxes under the Act, with the City of Chicago notably absent from that group (Bottan et al., 2017). According to Illinois Gaming Board 2020 records, almost $7.5 billion has been gambled away through 33,294 machines at 7,180 locations to the benefit of almost $1.9 billion in state gaming tax revenue and $375 million in local gaming tax revenue between September 2012 and December 2019.

Why have so many municipalities chosen to adopt policies extending the Illinois Video Gaming Act to their communities? Policy adoption of video gaming by a municipality requires implicit approval by the local municipal board, usually through an affirmative ordinance allowing or prohibiting video gaming (Toossi & Zhang, 2019). According to Illinois Gaming Board records, of the 1,298 Illinois municipalities eligible for implementation of video gaming between 2012 and 2019, a total of 961 municipalities collected revenues under the Illinois Video Gaming Act. Most of these municipalities started collecting revenues in the first two years, with 260 municipalities implementing video gaming and collecting revenues in just the final four months of 2012 and another 470 municipalities collecting initial revenues in 2013. As of December 2019, 337 municipalities had not collected any revenues under the Illinois Video Gaming Act.

Gambling literature suggests local municipal decision makers often seek to justify gaming expansion, which can be deemed by some as societally harmful with associated negative externalities, with offsetting positive economic externalities (Walker, 2007). Examples of local positive externalities include increased employment, consumer spending, or tax revenues (Walker, 2013, p. 9) while negative externalities include societal costs, such as increases in suicide, crime, and financial distress (Daraban & Thies, 2011, p. 146).

FIGURE 1

IMPLEMENTATION TIMELINE OF VIDEO GAMING BY MUNICIPALITIES IN ILLINOIS



Decisions by local officials to adopt avideo gaming policy might be weighed through a public policy evaluation approach known as cost-benefit analysis (Kraft & Furlong, 2020). While state legislators might view the success of video gaming through the economic lens of bond repayments — which has been questioned as both unethical and inefficient (Warnick, 2011; Grotto et al., 2019) — local municipal leaders might adopt a rational-choice approach to weighing the positives and negatives of implementing video gaming. Leaders might go about the policy implementation analysis for video gaming from a multitude of perspectives, from effectiveness and efficiency to social acceptability to liberty and freedom (Kraft & Furlong, 2020).

RESEARCH CONTEXT

The origins of modern gambling analysis in the United States started with Goodman (1994), who directed the United States Gambling Study. The study found that gambling expanded, in part, due to communities moving away from reliance on property taxes — sold as an easy, choice-driven tax on lower-income communities that often cannibalizes local economies (Gross, 1998). Further, Gross (1998) stated that gambling poses ethical issues for local leaders, especially due to lack of objective research on the subject. He posited that the cost-benefit scenario for gambling includes negative externalities, such as cannibalization of the local economy, increased crime, costs for addictive gambling, and destabilization of property values.

Exploration of the cost-benefit equation for gambling is still an ongoing and thriving research area. Since the introduction of legalized casino gambling in the early 1990s, the question of "who wins" in Illinois' gambling expansion has elicited much scholarly attention. Grinols (1995) framed this question with three economic issues: the social costs, the governmental tax policy, and the potential for economic development.

In regard to social costs, researchers have investigated many potential noneconomic community harms. Grinols and Mustard (2006) studied national crime trends at a county level within a 20-year period (1977-1996) of initial gambling expansion and found that an estimated 8% increase in crime near casinos was attributable to gambling. Locally in Illinois, Bottan et al., (2017) evaluated the municipal border between Chicago (with no video gaming) and suburban Cook County (with video gaming) to use a differences-in-difference strategy to examine whether video gaming correlated with an increase in crime

over time, identifying an attributable increase in both property and violent crimes. Recent research by Grumstrup and Nichols (2021) localizes to Illinois many of the gambling addiction conclusions exhibited nationally by Welte et al., (2017). Using spatial representation by zip code, Grumstrup and Nichols (2021) determined that a 1% increase in poverty rate correlated with a nearly 1.5% higher net wager, leading the authors to conclude video gaming taxation is regressive in nature.

In regard to governmental tax policy, Illinois gambling literature has focused on implementation and redistribution of tax dollars. Toossi and Zhang (2019) employed a probit analysis on implementation factors of local municipal video gaming adoption in Illinois. The authors adopted various models for fiscal health, political, socioeconomic, and demographic variables and concluded that municipalities with a greater share of Republican voters were more likely to enact video gaming. They also found that communities with a higher percentage of college-educated residents, senior citizens, and religious adherence were less likely to adopt video gaming. Meanwhile, Phipps et al., (2020) studied the displacement of casino tax revenues by video gaming revenues in Illinois, determining that while destination gambling decreased as video gaming revenues increased, overall gambling taxes rose in Illinois over the past eight years. While research is starting to describe and explain several factors regarding this new form of Illinois gambling, a gap in research exists about the effect of video gaming on the local economy that can be explored by considering the impact of video gaming expenditures on taxable retail sales.

ECONOMIC SUBSTITUTION: DRAIN OR DRAW FOR OTHER INDUSTRIES?

This study, however, focuses on the third area of the Grinols (1995) analysis regarding economic development. As Grinols (1995, p. 11) opined: "Whether any business adds to the economic base or diminishes it depends on whether the business draws more new dollars to the area that are then spent on goods and services in that area. To benefit the local economy these new dollars must exceed the number of dollars the business causes to be removed from the area." This potential for substitutive (negative) or complimentary (positive) results is defined in economics literature as substitution theory (sometimes labeled as economic cannibalization or even displacement) and is a microeconomic concept that a new product can divert consumption away from existing

products (Grinols, 1995; Marionneau & Nikkinen, 2020; Siegel & Anders, 1999).

Grinols and Omorov (1996) studied this relationship in Illinois casino gambling, comparing sales tax receipts for 10 sales sectors within 10 miles of seven casino sites. The authors reported results for the differing sectors for the effect of an average $1,000 of casino revenue. While results were mixed (automotive and filling stations showed gains while general merchandise, miscellaneous retail, and wholesale trade goods showed losses), Grinols and Omorov (1996) offered a "cautious conclusion […] that sales in general near the casino tend to rise (or are mixed) at the expense of sales 5-10 miles away" (p. 9).

A recent meta-analysis of gambling studies using economic substitution reviewed 118 eligible studies and categorized 44 studies with relevance to substitution theory and impacts on local economies (Marionneau & Nikkinen, 2020), including the Grinols and Omorov (1996) study. Studies focused on 15 different economic areas and were divided between two types of gambling: destination and convenience. In the analysis, destination gambling referenced casino-style gambling while convenience gambling was "characterized by higher accessibility, spatial dispersion, and local consumption" (Marionneau & Nikkinen, 2020, p. 20). The effect of convenience gambling on industries such as entertainment and recreation, restaurants and bars, hotels and tourism, and retail were all determined to be negative in nature.

However, upon closer inspection of the referenced research, more than half of the cited research and data exceed 25 years in age (Ackerman, 1997; Byron & Quiggin, 1996; Grinols & Omorov, 1996; National Institute of Economic and Industry Research, 2000), and almost all of the cited studies focus on the impact of casino gambling. This study fills a gap in research by studying the substitution effects of a state convenience gambling program. Not only do the results of this study inform local retail businesses to the impact of a municipality's choice to implement gaming within a community, but these results directly answer the question of displacement of local retail sales taxes for the local municipality, a subject that is vitally important to the same local decision-makers who are implementing the video gaming program. Local sales taxes represent a unique source of revenues for Illinois municipalities, which — unlike local property taxes — are not prone to competition from other local taxing districts (Graham, 2016). Therefore, these study results answer not only the question of whether a dollar lost to video gaming takes a dollar away from

a local retailer but also the question of whether local video gaming tax receipts are new revenue for a municipality or just revenues replacing lost local sales tax dollars.

DATA AND METHODOLOGY

The data for this analysis has been derived from four main sources: the Illinois Department of Revenue, the Illinois Gaming Board, the American Community Survey five-year estimates from the U.S. Census Bureau, and the Bureau of Economic Analysis. Using panel regression, a model is estimated for the relationship between net wager (or dollars lost to VGTs) and retail sales, which is proxied through the 1% municipal sales tax collected by the Illinois Department of Revenue and remitted back to the local municipalities. Using the immense variation between the 1,298 municipalities that collected sales tax revenues during the study period (2012-2019), correlation between these two variables can help to answer the research question as to whether local gambling dollars lost creates economic substitution that causes a decrease in local retail sales.

The dependent variable, municipal retail sales, is proxied through the standard 1% sales tax levied and collected by the state and remitted back to local municipalities. This variable, while only measuring the impact of spending on retail purchases and not spending on services, is standardized and reported for every municipality in the state. It is important to note that the overall municipal sales tax varies greatly by municipality in Illinois due to the local additions of home rule sales taxes, non-home rule sales taxes, automobile renting taxes, and business district taxes. The City of Chicago also levies an additional home rule use tax. However, these additional taxes are collected and reported separately in the Illinois Department of Revenue monthly reports.

The independent variable of interest — net wager by municipality — is reported monthly by municipality through Illinois Gaming Board reports. Net wagering statistics were annualized and represent the amount lost by gamblers in VGTs within each municipality. Selection of net wager is consistent with an accurate representation of gambling expenditure suggested in the literature (Anderson, 2005, p. 313; Leven & Phares, 1997, p. 433; Siegel & Anders, 1999, p. 115). This analysis excludes net wagers lost by gamblers at locations within the unincorporated areas of Illinois counties outside of municipal boundary limits.

Additional independent control variables were selected from U.S. Census Bureau estimates from the American Community Survey, which provides annual data at the municipal level. Several sources of local governmental sales tax forecasting literature suggested data involving retail activity, consumer trends, housing market movements, population growth, personal income, and unemployment, including employment class sizes (Swanson, 2008; Wong, 2017). U.S. Census Bureau American Community Survey five-year estimates yielded the necessary municipal data for incorporation into the study, including data for population (Table DP05), poverty status (S1701), median income (S1901), labor force, retail employment, construction employment, and arts, entertainment, recreation, accommodation, and food services employment (S2405).

Municipal consumer price index (CPI) data was collected from annual estimates reported by the Bureau of Economic Analysis in regional price parities measures by state and metro area. Each Illinois county was grouped into bureau-designated metropolitan statistical areas. County affiliation was attached to the municipalities using single-point coordinates from the ESRI USA National Atlas City Populations data set and populated within ArcGIS, providing regional CPI annual data for each municipality. Additionally, annual countywide gross domestic product (GDP) data was collected from the Bureau of Economic Analysis for each year through its GDP by county, metro, and other areas data set. This data was also attached to individual municipalities using the same single-point coordinates data from the ESRI USA National Atlas City Populations data set and populated within ArcGIS.

The selected period (2012-2019) for this panel data analysis (t=8) is driven by the available municipal data from the Illinois Gaming Board as well as consideration of outside sales trends, such as the Great Recession, implementation of the "Amazon tax," and the COVID-19 pandemic. Additionally, U.S. Census Bureau American Community Survey five-year estimates are available by municipality from 2012 to 2019.

Independent variables were tested for covariance between variables using a simple correlation matrix. Correlation between variables can present multicollinearity problems in panel estimation models. Therefore, variables displaying strong correlation should be eliminated from the regression analysis. For this panel estimation, variables for retail employment, construction

employment, recreational employment, poverty rate, and labor force were all excluded.

Panel data regression is a combination of cross-sectional and time-series regression, where data is observed over multiple geographic areas and time periods, which helps to control bias from unobserved independent variables. According to Hsiao and Yanan (2006), some advantages of panel data estimations include greater accuracy of model parameters and greater capacity to explore the complexity of human behavior, including the ability to control for omitted variables. Using the statistical computation program Gretl, the independent variable of interest (net wager) was tested against the dependent control variable (sales tax), controlling for population, median income, CPI, and countywide GDP. (Additional tests to determine levels of efficiency and bias within the panel regression are detailed in the Appendix.)

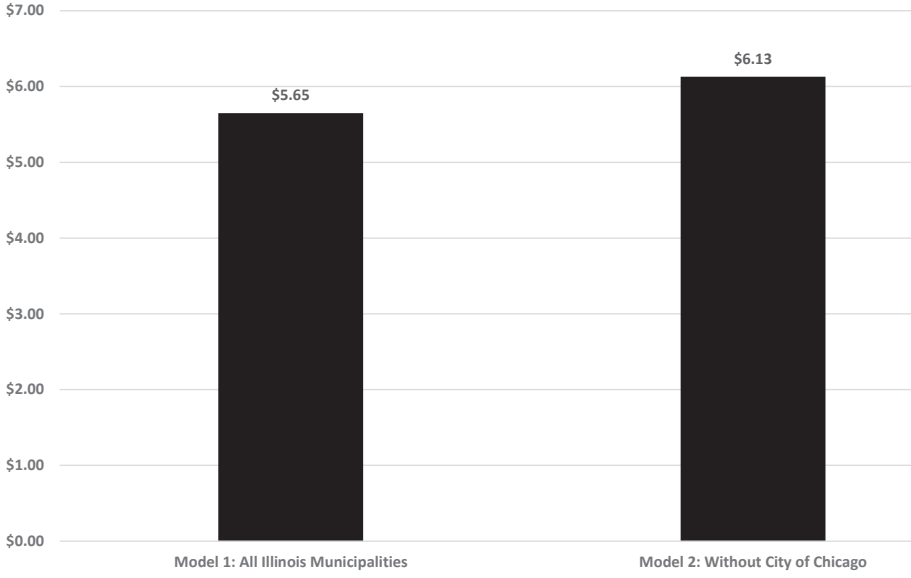
The resulting fixed-effects panel regression model allows for analysis of the correlative effect of the independent variable of interest (net wager) within individual municipalities on the dependent variable (sales tax), controlling for the population, median income, CPI, and countywide GDP of the municipality. Statistically significant results will indicate correlation between the variables, and R-squared results help to determine the explanatory power of the panel model estimation.

ANALYSIS AND FINDINGS

A fixed-effects panel model found positive, statistically significant covariance between the municipal net wager and sales tax, meaning video gaming within local communities not only does not harm retail sales economies by cannibalizing the dollars lost in the gambling activity (thus creating an economic substitution or displacement effect), but the gambling activity actually increases retail sales within the municipal jurisdictions. Therefore, the hypothesis of a negative relationship between net wagering and local retail sales is rejected and, in fact, the opposite effect (retail economic growth) is validated. Therefore, the research question of whether a negative relationship between net wagering of Illinois video gaming activity and local retail sales activity within a municipality is refuted. However, despite the positive correlative results, the lack of model fitness as determined by the R-squared values indicates that many other unobserved variables impact retail sales more than gambling.

FIGURE 2

THE EFFECT OF $1 LOST IN NET WAGER ON RETAIL SALES PER ILLINOIS MUNICIPALITY



The fixed panel regression results show a positive correlation between the independent variable of interest net wager and municipal sales tax that is statistically significant with a p-value of less than 0.01. The resulting slope coefficient can be estimated to observe that for each $1 lost in a gaming machine, a resulting $0.05656 in municipal sales tax was generated, controlling for population, median income, CPI, and countywide GDP. Based on the 1% sales tax rate, an increase in $5.66 in retail sales can be attributed to the loss of each $1 in wagering.

Population and countywide GDP also demonstrated statistically significant correlation with the dependent variable municipal sales tax, with population and countywide GDP both driving a positive correlative effect on sales taxes. The control variables for median income and CPI are included in the panel effects model, but neither variable registered statistically significant results. However, while positive correlation is estimated within the model, the reported "within R-squared" total for the model estimation indicates very little explanatory power for the independent variables upon municipal sales taxes, indicating that the literature search and chosen data sets omit many possible

other variables that would help to explain the variance of the 1% sales tax levy between Illinois municipalities. With a "within R-squared" total of 0.084392, the panel data model likely explains only 8% of the movement in the dependent variable.

A second panel regression model that excludes the City of Chicago (n=1,297) only slightly improves the "within R-squared" results. By removing the largest municipality in Illinois (Chicago has not enacted video gaming), statistical significance for the population and countywide GDP variables increases, and the slope coefficient for the independent variable of interest (net wager) increases slightly. Excluding Chicago, for each one unit increase in net wager, a corresponding increase of $0.06133 in municipal sales is displayed. This amount of sales tax translates into a growth in economic retail sales of $6.13 for every $1 lost to gambling.

While the methodology of this study and the Grinols and Omorov (1996) study differ greatly (due in part to the vast difference in sites — seven casino locations in 1996 versus over 7,000 locations in 2019), the sectoral analysis from the 1996 study provides hints at possible theories as to why the modern Illinois Video Gaming Act might provide a positive net result for retailers. In the 1996 study, positive results were established for gas stations while mixed results were found for food, drinking, and restaurants. In the 2009 video gaming legislation, Illinois legislators emphasized these sectors when placing licensing for VGTs in truck stops, restaurants, and licensed beverage establishments. While this study does not specifically isolate these individual retail sectors, future study of the Illinois video gaming program could provide greater explanation of this potential connection.

LIMITATIONS AND CONTRIBUTIONS

Several limitations have created obstacles for improving available data for this study. As stated earlier, municipalities have been geographically analyzed using point data through ArcGIS. Point data, as opposed to polygon data, does not allow for consideration of municipalities that stretch over county boundary lines. While this provided simplification in attributing CPI and countywide GDP data to individual municipalities, municipalities are often more dynamic geographically than point data can visualize. Similarly, a significant amount of gambling simultaneously occurred outside of municipal boundaries in the unincorporated portions of individual counties. Much of this activity likely

transpired near a neighboring municipal boundary — but pinpointing which municipality would require the geocoding of thousands of video gaming locations. Furthermore, while a similar measurement exists for sales tax collections in the unincorporated portions of individual counties, the sales tax rate is lower and the geographical density more depolarized. Those are two items that would require a more complex analysis. So, while this study provides an interesting analysis of municipal data that can inform future actions by municipal leaders, certain county data for the less-dense "gap" areas between municipalities is excluded.

An additional limitation of this analysis is the sole focus on retail sales. Services are not taxed in Illinois, so there is not an easy measure for judging the impact of video gaming on the service portion of the economy. And, finally, the lack of implementation by the City of Chicago provides an acknowledged limitation in the study results. As the municipal unit with the largest population within Illinois, the City of Chicago serves as the largest economic engine within the state, accounting for almost 16% of all the taxable retail sales. While excluding Chicago from the data set provides a 3% increase in the R-squared explanatory power of the panel regression, the increase in slope coefficient for the remaining 1,297 Illinois municipalities is likely due to the movement of Chicago gambling patrons into suburban Cook County municipalities. While this fact is no different from accounting for the impact of gambling patrons from other border cities outside of Illinois (Davenport, Iowa; St. Louis, Missouri; Paducah, Kentucky; Terre Haute, Indiana), the size and density of Chicago provides a challenge for results interpretation.

The strength and contribution of this study lies in the panel data methodology. By using a robust number of cross-sectional units over the eight-year period, the study results provide for a stronger overall analysis than using just statewide data in a traditional time-series analysis. By incorporating a robust number of cross-sectional units, with more than 10,000 individual observations, the geographic variation can be used to control bias from unobserved variables.

In conclusion, municipal leaders should not fear retail losses for the community when implementing video gaming. While this type of gambling produces a modest positive impact of nearly $6 in new retail spending for every $1 lost to gambling, the overall variation in retail sales is impacted by many other variables that could not be identified through this study. In this case, the theory of economic substitution is disproven. When balancing the cost and benefits of

local video gaming within a community, local municipal leaders can be assured that the adoption of video gaming within local communities does not displace or detract from local retailers' net sales.

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APPENDIX

TABLE A1.1

RESULTS OF THE PANEL ANALYSIS OF VIDEO GAMING EXPENDITURES ON MUNICIPAL RETAIL SALES

FIXED-EFFECTS PANEL REGRESSION								
DEPENDENT VARIABLE: SALES TAX	FULL MODEL (WITH CHICAGO) n=1,298 t=8				MODEL WITHOUT CHICAGO n=1,297 t=8			
VARIABLE	COEFFICIENT	Z	P-VALUE		COEFFICIENT	Z	P-VALUE	
Constant	-4,914,350	-1.968	0.490	*	-1,890,910	-1.724	0.085	
Net Wager	0.0565605	2.609	0.009	***	0.0613347	3.610	0.000	***
Population	578.597	2.454	0.014	**	291.493	3.575	0.000	***
Median Income	-0.623389	-0.596	0.551		0.416502	0.737	0.461	
CPI	-3,193.86	-0.389	0.697		1730.09	0.247	0.805	
Countywide GDP	0.0414338	2.156	0.031	**	0.023182	3.784	0.000	***
Within R-squared	0.084392				0.118777			
Log-likelihood	-152624.5				-145303.3			
Robust Errors	Arellano (HAC)				Arellano (HAC)			
Time-fixed effects	Yes				Yes			

*Note: The data set was tested for suitability for pooled ordinary least squares, fixed-effects, and random-effects panel regression. Tests for cross-sectional dependence (Pesaran CD test), named aggressors, and differing-group intercepts all yielded results indicating the use of fixed-effects panel regression for best model estimation. Tests for the suitability of random-effects regression modeling, including analysis of inconsistent GLS estimation (Hausman test) and correlation between the regressors and their unique errors (Breusch-Pagan test), both indicated a better fit for fixed-effects panel regression. To correct for heteroskedasticity and autocorrelation, HAC-robust standard errors were deployed. A Wooldridge test for autocorrelation indicated the potential of cointegration within the data. A differenced model estimated as a robustness check found similar statistical significance between the independent and dependent variable. This cointegration is likely due to shared long-term trends within the panel data. While HAC-robust standard errors corrected this cointegration for efficiency, the results are not likely unbiased. *** - p<0.01, ** - p<0.05, * - p<0.10*