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Assessing State Economic Development from Motion Picture and Television Production Incentives: Standardizing the Industry for Analysis

by

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and

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Abstract. Studies of the economics of state fiscal incentives for the motion picture and television industry lack consistency in methodology. A key inconsistency is the use of differing levels of industry aggregation. This study unpacks aggregate sector multipliers for 48 states and shows how use of aggregated measures for the motion picture and television industry can lead to inaccurate input-output multipliers and empirical estimates of the role of incentives in the location of the industry. In practice, regional input-output models need to be modified to reflect the economic differences across activities in the aggregate sector, particularly for states that contain little of the targeted activity. A case study shows that a practical alternative is to use aggregate multipliers from similar states with large concentrations of the industry.

1. Introduction

Beginning in the late 1990s states increasingly adopted fiscal incentives to attract motion picture and television filming to their states. Forty-four states, plus Washington D.C. and Puerto Rico had film incentive programs in place by 2009 (National Conference of State Legislatures, 2018). Leiser (2017) concludes that the spread of state film incentives appeared to have been driven by both pressure from the industry within states and by the number of other states with incentives. Between 2009 and 2018, controversies and budget difficulties led thirteen states to end their incentive programs and others to modify their programs (National Conference of State Legislatures, 2018).

A large number of economic impact studies have been conducted in the evaluation of state film incentives as a tool of economic development (for reviews see Weiner, 2009; Christopherson and Rightor, 2010; Tannenwald, 2010). An academic literature similarly has emerged that empirically estimates the effects of incentives on film production and economic outcomes (Adkisson, 2013; Swenson, 2017; Button, 2018, 2019; O'Brien and Lane, 2018; Thom, 2018, 2019; Bradbury, 2019, 2020; Owens and Rennhoff, 2020). The metrics used to evaluate

the economics of state film incentives range from the number of motion pictures and television series produced and associated spending in a state to indicators of labor market outcomes.

An important consideration in economic analyses of state film incentives is the choice of sector classification in which the motion picture and television filming occurs, including the detail of the classification. The aggregate sector in which the industry is classified is Motion Picture and Video Production (NAICS 512). The sector includes the four-digit categories of Motion Picture and Video Industries (NAICS 5121) and Sound Recording Industries (NAICS 5122). State film incentives mostly incentivize activity in NAICS 5121 (McDonald, 2011), though incentives also can be used for other entertainment activities such as in Louisiana (Loren C. Scott & Associates, 2017).

The choices made on whether to use the aggregate sector or components of the sector are wide-ranging across the economic impact and empirical academic studies. The problem is that the incentivized component of the film and television industry may greatly differ economically from the rest of the aggregate sector. Differences of an activity from the rest of its aggregate sector can affect input-output multipliers used in economic impact analysis (Low and Isserman, 2009; Schmit et al., 2016) and empirical estimates of the responsiveness of activity to incentives (Oxford Economics, 2017). The problem can be particularly acute with motion picture and television production because of its concentration in a relatively few number of states (Button, 2018). Consistent with the general need for standards in evaluating government-incentivized activity (Wassmer et al., 2016), standards are needed for assessing the economic development from motion picture and television production in a state. Therefore, in this study we attempt to standardize industry classification of motion picture and television production for analysis of the economics of state film incentives.

In the next section we first review the varying classifications of motion picture and television production in studies related to the industry and highlight some of the associated variation in key findings. The review is followed by drilling down on the composition of the aggregate sector containing the motion picture and television industry in Section 3. In Section 4,

we then unpack state multipliers for the aggregate sector produced by the input-output modeling system, IO-Snap (2019), to provide guidance in the use of input-output multipliers in economic impact studies (Liu and Warner, 2009) and empirical analyses of the film and television industry. To illustrate the importance of the issue in practice we include a hypothetical economic impact case study. The unpacking and empirical verification of the input-output multipliers is generalizable to economic analysis of other aggregate sectors in which the composition of the sectors greatly differs across regions. The last section of the paper contains conclusions from the study and suggestions for future research.

2. Classifications of the Motion Picture and Television Industry in Practice

We first briefly review a sample of notable recent state film incentive economic impact studies to illustrate the variation in the specification of the film and television industry within the North American Industrial Classification System (NAICS). We choose states that feature prominently in the film industry and use of incentives for which notable studies have been done. We review multiple studies of New York because of its prominence in the film industry and for comparison. We also examine studies of Louisiana, New Mexico, Oklahoma, Pennsylvania, and Georgia. The key features of the studies are highlighted in Table 1. Besides the NAICS classification of the spending, we highlight the assumed role of incentives in direct spending, the input-output model used and the associated multipliers, and the estimated return on incentive investment and the dollar incentive cost per job.

The direct spending in the studies is believed primarily to occur in select sub-sectors of the aggregate sector of Motion Picture and Sound Recording Industries (NAICS 512). Based on supplementary data, Christopherson et al. (2006) include one-third of NAICS 71151, Independent Artists, Writers and Performers, as directly attributable to film incentives. In contrast to Christopherson et al. (2006), Loren C. Scott & Associates (2017) argues that activity in the Independent Artists, Writers and Performers sector (NAICS 7115) is captured by input-output linkages with NAICS 512. Christopherson et al. (2006) adjusts the sector in the input-output model that is most related to filming activity for outside estimates of employee

compensation and business income. A questionable feature of the Independent Fiscal Office (2019) study is the reported use of the Independent Artists, Writers and Performers sector instead of a motion picture sector. The studies do not attempt to account for the influence of tourism.

IMPLAN is the most often used input-output model in the studies reviewed.¹ With one exception, the studies use Type II multipliers, which include both the indirect spending effects between industries and the induced spending by households. The sole exception is the use of the IMPLAN Social Accounting Matrix (SAM) multiplier in Ernst and Young (2009), which endogenizes other local final demands beyond consumption.² Although employment in a state often is reported for the five or six-digit categories within NAICS 512, the IMPLAN model sector for the industry corresponds to the aggregate sector.³ The RIMS II multipliers produced by the U.S. Bureau of Economic Analysis (BEA) are at the four digit level (NAICS 5121).⁴ There are 1,000 industries in the input-output model of the private firm EMSI, but it is unclear how the detail that goes beyond the BEA national tables, which provide the technical coefficients for regional input-output models, is derived.⁵

The economic impact studies uniformly omit discussion of how the motion picture and television spending is entered into the model. If there are modifications to the input-output model, they are not discussed in any detail. Not surprisingly then, the reported or implied multipliers widely vary across the studies and it is difficult to assess their veracity.

The most commonly reported multipliers are for output and employment, though they sometimes have to be inferred from the reported direct and total impacts. Output multipliers range from 1.37 for Louisiana (Loren C. Scott & Associates, 2017) to 3.57 for Georgia (Georgia Tech Center for Economic Development and Research, 2019). Employment multipliers range from 1.21 for Oklahoma (The PFM Group, 2016) to 3.1 for New York (Ernst and Young, 2009).

¹ <https://www.implan.com/>

² <https://implanhelp.zendesk.com/hc/en-us/articles/115009674768-Explaining-the-Type-SAM-Multiplier>

³ <https://implanhelp.zendesk.com/hc/en-us/articles/360034896614-546-Sector-Industries-Conversions-Bridges-Construction-2018-Data> (IMPLAN Sectors)

⁴ https://www.bea.gov/sites/default/files/methodologies/RIMSII_User_Guide.pdf

⁵ <https://www.uhv.edu/president/economic-impact-study/appendices/appendix-5-emsi-mr-sam/>

The alternative values for New York reveal that it is not simply the examination of different states that produce the variation in multipliers, but it also differences in study methodology.

The differences in methodology lead to widely varying estimates of the incentive cost per job. A number of studies conducted by private consultants estimate a net budget surplus from New York's film incentives rather than a cost (i.e., a return on incentive investment greater than one) (Camoin Associates, 2019a; Ernst and Young, 2009; and HR&A Advisors (2012). Other rates of revenue return on incentive investment (ROI) include the low of values of \$0.13 for Oklahoma and Pennsylvania. Contrasting values often are reported for the same state: Louisiana—\$0.23 by Loren C. Scott & Associates (2017) vs. \$0.35 by Camoin Associates (2019b); New Mexico—\$0.14 by Popp and Peach (2008) vs. \$0.33 by MNP LLP (2014); and New York—\$0.61 derived from Christopherson et al. (2006) vs. those above one by Camoin Associates (2019b), Ernst and Young (2009), and HR&A Advisors (2012). These estimates generally fall within the ranges of values reported in earlier reviews of economic impact studies (Weiner, 2009; Christopherson and Rightor, 2010; Tannenwald, 2010).

The role of incentives in state film activity in studies is based on subjective assessments and not empirical analysis. A typical assumption is that most or all spending receiving tax credits occurs because of them. This most likely overestimates the linkage as state film production occurs in states without incentives and occurs in states prior to their adoption of incentives. Sometimes spending or changes in spending from productions not receiving incentives is linked to incentives on the assumption of cluster benefits emanating from the spending receiving incentives (Ernst and Young, 2009; HR&A Advisors, 2012). Changes in spending also could occur for reasons other than incentives, biasing upwards the assumed incentivized spending. The dollar incentive cost per job range from a net positive revenue return in studies with ROIs that exceed one to a cost of \$56,917 for Pennsylvania. The estimate for Pennsylvania in part is high because it is calculated in term of full-time equivalents, whereas typically adjustments are not made for full-time equivalency. More common are estimates of dollar incentive costs per job in the thirteen to fifteen thousand dollar range.

An empirical literature has emerged that tests the assumption by economic impact studies of the connection between incentives and motion picture and television filming. Consistent with that for economic impact studies, as shown in Table 2, there is no uniformity in sector definition in empirical studies of labor market outcomes from state film incentives. The most common detailed sector examined is Motion Picture and Video Production, NAICS 51211. But many studies simply examine NAICS 512 or 5121 (Motion Pictures and Video Industries). A few studies examine other components of NAICS 5121. Button (2018) examines other industries that might be indirectly stimulated by motion picture and television filming such as NAICS 71151. The studies also vary in their conclusions, which in part may be related to the differences in industry definition. Interpretation of the findings for NAICS 512 or 5121 is problematic if they contain local demand-based activity as discussed below.

3. The NAICS 512 Sector

The sector, Motion Picture and Sound Recording Industries (NAICS 512), includes the four-digit categories of Motion Picture and Video Industries (NAICS 5121) and Sound Recording Industries (NAICS 5122). State film incentives mostly incentivize activity in NAICS 5121 (McDonald, 2011), though some states include incentives for other entertainment activities such as Louisiana (Loren C. Scott & Associates, 2017).

Among the six-digit categories of NAICS 5121, two of them likely primarily satisfy local demand and unlikely respond to incentives: NAICS 512131 (Motion picture theaters except drive-ins) and NAICS 512132 (Drive-in motion picture theaters). The four six-digit categories of NAICS 5121 most likely to be affected by incentives include NAICS 512110 (Motion Picture and Video Production), NAICS 512120 (Motion Picture and Video Distribution), NAICS 512191 (Teleproduction and Postproduction Services), and NAICS 512199 (Other Motion Picture and Video Industries). Therefore, multipliers for either NAICS 512 or NAICS 5121, the NAICS detail for which US BEA input-output information is available, will be misleading for incentivized-activity to the extent its linkages to other sectors and wage rates differ from those of the three- or four-digit NAICS aggregates.

Based on U.S. Bureau of Labor Statistics QCEW data for 2017, the year for which BEA multipliers are available, there are significant differences in pay across the sub-sectors in Motion Picture and Sound Recording Industries nationally (Table 3). The highest paid jobs are in the Motion Picture and Video Distribution sub-sector (NAICS 51212) with average pay of \$147,975. The lowest paid jobs are in Motion Picture and Video Exhibition (NAICS 51213), which encompasses NAICS 512131 and 512132, with average pay of \$14,352. Average pay in Motion Picture and Video (NAICS 51211), the largest of the sub-sectors, is \$95,652, far above the average for the aggregate sector (NAICS 512) \$68,104.

Figure 1 shows that not only does Motion Picture and Video Production (NAICS 512110) dominate in size amongst the export-related sub-sectors, but it is also the primary source of growth from 2001 to 2019. This supports the focus on the sector in many economic impact and academic empirical studies. As shown in Figure 2, the real annual wage rate only increases in the Motion Picture and Video Distribution sub-sector (NAICS 512120) over the period, while decreasing in Other Motion Picture and Video Industries (NAICS 512199). The real wage rate remains fairly constant in the other two sub-sectors.

The QCEW data for the sub-sectors of NAICS 5121 are not perfect measures of the industry. A related NAICS sector (711510) for the film and television industry is Independent Artists, Writers, and Performers. The effects of the sector though are captured, either partially or fully, as an input in production of NAICS 5121 using input-output analysis in economic impact studies (Christopherson and Righthor, 2010; Loren C. Scott & Associates, 2017). Another concern with the QCEW data is the omission of proprietors. US Bureau of Economic Analysis total employment includes proprietors but it is only reported for NAICS 512. Oxford Economics (2017) reports almost no correlation between state-level QCEW employment in NAICS 51211 and BEA employment in NAICS 512 over the 1998-2013 period, suggesting the aggregate measure may be a poor metric for assessing the economic impacts of film incentives.

The average ratio over the period of BEA total employment, which includes proprietors, and BEA wage and salary employment for the aggregate sector Motion Picture and Sound

Recording sector (NAICS 512) is 1.16. There is only a slight negative and statistically insignificant relationship between the ratio across states in 2017 and the Census County Business Pattern share of employment in NAICS 51211 in the aggregate sector, suggesting that adjusting by the NAICS 512 total employment to wage and salary employment ratio may be appropriate for estimating the proprietor impact in NAICS 51211.

4. State Input-Output Multipliers for the Motion Picture and Television Industry

Multipliers used in economic impact studies of the motion picture and television industry greatly affect its estimated economic returns to incentives. With a basic economic model, a doubling of predicted multiplier effects doubles the ratio of gross benefits to costs of incentives (Bartik and Sotherland, 2019). Multipliers depend in part on the extent of linkages within the state economy. Because of a lack of complete data on these linkages, especially at the sub-national level, film incentive impact studies rely on models produced by the U.S. Bureau of Economic Analysis (RIMS II) or private entities such as EMSI, IMPLAN or REMI⁶. Regional models differ in many ways, including the data used, industry level of disaggregation, model closures, and assumptions on the linkages in the economy and their measurement (Rickman and Schwer, 1995).

4.1 Multiplier Estimates

In the absence of survey data on sales and expenditures by industry and between industries in a region as well as on imports and exports (Harris and Liu, 1998), the starting point for all U.S. regional input-output models are the national input-output accounts of the U.S. Bureau of Economic Analysis (BEA) at the four-digit level. Type I output multipliers for NAICS 5121 and NAICS 5122 for the nation can be obtained from the BEA total requirements matrix as 1.68 and 1.25, respectively.⁷ A multiplier for NAICS 512 would understate the effects of activity in NAICS 5121 and overstate the effects of activity in NAICS 5122. The problem becomes more acute for activity incentivized in specific six-digit categories of NAICS 5121.

⁶ <https://www.remi.com/models/>

⁷ https://apps.bea.gov/industry/xls/io-annual/IxI_TR_2007_2012_PRO_Det.xlsx

National multipliers for NAICS 5121 and 5122 likely mask significant differences across states, in part because of the differences in the relative sizes of components across the states and differences in size of the states. We investigate this using IO-Snap (2019), which produces state-level Type I and Type II multipliers for output, income, and employment for 67 sectors.

An aggregate three-digit (NAICS 512) Type I output multiplier for the US can be obtained as 1.58 from IO-Snap (2019), which is based on BEA input-output and industry data.⁸ The corresponding Type II output multiplier from IO-Snap is 2.48.⁹ The three-digit Type I multiplier of IO-SNAP is closer to the BEA Type I four-digit multiplier for NAICS 5121 because it comprises nearly ninety-five percent of NAICS 512 employment.

Table 4 displays the Type II multipliers for the lower 48 states from IO-Snap. All multipliers are smaller than the multiplier value of 2.48 for the U.S. The smaller state multipliers occur because the aggregate Motion Picture and Sound Recording Industries sector and other sectors affected by indirect and induced spending will spend more outside a state than all the sectors will spend outside the U.S.; i.e., import spending will be higher in a state than the nation. This lessens the ripple effects of spending by the Motion Picture and Sound Recording Industries sector across a state economy compared to those across the national economy.

California has the largest IO-Snap aggregate sector output multiplier. This likely relates to the size of the California economy, the concentration of the industry in California, and California's high labor compensation in the sector. In 2017, BEA total employment in California comprised nearly 23 percent of the nation's total employment. California's Motion Picture and Sound Recording Industries BEA total employment comprised over 35 percent of the national total in the sector. The ratio of California's employment share in the sector to its overall employment share is 1.55, commonly referred to as a location quotient (LQ).

⁸ IO-Snap is a software that uses data on input-output transactions, employment, compensation, and gross state product from BEA to produce full input-output analytical capabilities for the nation, states, and sub-state regions.

⁹ Corresponding IO-Snap Type I and II employment multiplier values for the U.S. are 1.90 and 3.41, while the corresponding income multipliers are 1.71 and 2.80.

Among the top ten states for largest output (spending) multiplier, nine of them (with Florida as the exception) have a top ten ranking for its LQ. New York is the only state other than California with an LQ above 1. Together, California and New York are home to nearly one-half of Motion Picture and Sound Recording jobs nationally in 2017. The simple correlation between the Type II multiplier and the LQ across states is 0.75. This suggests that it is not just the size of the overall state economy that matters for the Motion Picture and Sound Recording Industries multiplier but also the size of the industry in the state.

California ranks first with its average compensation of \$107,861 per employee in Table 4, while New York ranks second with compensation of \$95,852 per job. The simple correlation between compensation per employee and the Type II output multiplier across states is 0.76. In addition, the simple correlation between the LQ and compensation is 0.91. Because of the differences in pay across the sub-sectors nationally (Table 3), a likely contributing factor to the differences in compensation in Motion Picture and Sound Recording Industries across states are the differences in sub-sector composition of employment in the aggregate sector (NAICS 512).

The composition of employment across the components of the Motion Picture and Sound Recording Industries greatly varies across states. To preserve confidentiality of survey respondents as required by law, QCEW data are suppressed for the sub-sectors in many states. To examine the composition of the industry, we instead use the estimates of unsuppressed data produced by the W.E. Upjohn Institute for Employment Research (Bartik et al., 2018) based on the method of Isserman and Westervelt (2006) for Census County Business Patterns Data.

From Table 5, we see that with the exception of Tennessee (with Nashville), Motion Picture and Video Industries (NAICS 5121) employment in a state nearly comprises the entirety of that for the Motion Picture and Sound Recording Industries sector (NAICS 512). The share of Motion Picture and Video Production (NAICS 51211) employment relative to that of the aggregate sector (NAICS 512) exceeds one-half in California (0.8), Louisiana (0.8), New Mexico (0.74) and New York (0.62). Other sizeable shares are shown in Connecticut (0.42), Georgia (0.41), New Hampshire (0.4) and Oregon (0.37). Utah stands out as the only state with a large

sub-sector employment share in Postproduction Services and Other Motion Picture and Video Industries (NAICS 51219). The aggregate sector in the remainder of the states is dominated by Motion Picture and Video Exhibition (NAICS 51213), largely comprised of lower paid jobs in local movie theaters.

4.2 Unpacking the Multipliers

The correlation coefficients in Table 6 reveal the importance of the sub-sector composition of NAICS 512 for the estimated multipliers. The states with larger sub-sector employment shares in Motion Picture and Video Production (NAICS 51211) tend to be those with larger predicted output multipliers by IO-Snap for the aggregate sector (NAICS 512), in which the simple correlation between the employment shares in NAICS 51211 and multipliers is 0.75. Sub-sector employment shares in NAICS 51211 are by far mostly associated with smaller shares in NAICS 51213, in which the simple correlation between the two is -0.90. The NAICS 51213 share is strongly negatively correlated with the NAICS 512 multiplier. The differences in the NAICS 51211 and NAICS 51213 shares across states leads to differences in compensation and spending on other sectors in the state economy, both of which affect the estimated multiplier. Relative concentration of NAICS 51211 in the aggregate sector is associated with higher LQ's and higher compensation in the aggregate sector, while the exact opposite is true for dominance of NAICS 51213 in the aggregate sector. No strong patterns are evident for the NAICS 51212 and NAICS 51219 shares.

Total employment and population density are statistically insignificant when added to a linear regression of the multiplier on the NAICS 51211 employment share (not shown). This suggests that NAICS 51211 dominates the multiplier differences across states, not other state characteristics. The NAICS 51211 share though is positively correlated with total employment in the state ($r=0.47$), indirectly causing the multiplier to be correlated with total employment in the state ($r=0.49$).

Table 7 contains a decomposition of the multiplier for the Motion Picture and Sound Recording Industries produced by IO-SNAP for the U.S. and several states. States selected

include those with the largest multipliers and those with much smaller multipliers who have had or currently have film incentives. Included are the first-round effects, the indirect effects, and induced effects. When added to the exogenous change of one unit, the sum of the first-round and indirect effects produce the Type I multiplier, while the Type II multiplier is derived by then adding the induced effects. Also included are the direct requirements matrix entries for each state for the three sectors with the largest IO-Snap direct requirements entries for the nation: Motion picture and sound recording industries, Miscellaneous professional, scientific, and technical services, and Performing arts, spectator sports, museums, and related activities.

The three largest direct requirements matrix entries comprise approximately sixty-two percent of the first-round effect for the U.S. The first-round effects for states with a larger presence of the film industry are close to those for the U.S., including the three direct requirements entries. The states with a smaller film industry presence have much lower first-round effects and direct requirements entries for the three sectors. Induced effects follow a similar pattern to the first-round effects, though compensation levels contribute to variation in the induced effects, consistent with Louisiana and New Mexico having comparable first-round effects to California's but much lower induced effects.¹⁰

The larger IO-Snap first-round effects in the states with a larger film industry likely occur because of larger presences of the industries with larger direct technical requirements entries. A greater presence of an industry, all else equal, produces larger regional trade coefficients and larger regional production coefficients in a state direct requirements matrix derived from national technical coefficients (Schaffer, 2020, p. 57). We further explore this by examining the correlation of the estimated first round effects with state employment shares in NAICS 51211 and detailed sub-sectors representing the aggregate IO-Snap sectors in Table 7 (Miscellaneous professional, scientific, and technical services, and Performing arts, spectator sports, museums). The sub-sectors chosen have among the top six largest direct requirements coefficients in the

¹⁰ A simple linear regression produces statistically significant positive relationships of both the first-round effects and compensation levels on the induced effects.

detailed U.S. BEA input-output accounts within their corresponding IO-Snap sectors for NAICS 5121¹¹: Advertising and Related Services (NAICS 5418), Other Professional, Scientific, and Technical Services (NAICS 5419), Promoters of Performing Arts and Sports and Agents for Public Figures (NAICS 7113), and Independent Artists, Writers, and Performers (NAICS 7115).¹² The other two sectors in the top six not examined are: Other Activities Related to Real Estate (NAICS 53139) and Commercial and Industrial Machinery and Equipment Rental and Leasing (NAICS 5324).

Table 8 reveals the correlations between NAICS 51211 and the four detailed sub-sectors QCEW employment shares of total employment in the state. The strongest correlations are with Advertising and Related Services (NAICS 5418) and Independent Artists, Writers, and Performers (NAICS 7115). The only weak correlation is with Other Professional, Scientific, and Technical Services (NAICS 5419), though the sub-sector is strongly correlated with the other three related sub-sectors.¹³ The correlation coefficients for NAICS 51211 employment shares support the largest NAICS 512 IO-Snap state direct requirements coefficients as representing NAICS 51211 linkages with other sectors in the state.

4.3 Hypothetical Case Study

To illustrate the importance of the above findings regarding the use of aggregate multipliers for economic impact analysis of the movie and television industry we next consider a hypothetical case study of Oklahoma expanding its current incentive program with a cap of \$8 million to \$100 million. An expansion to \$100 million would put Oklahoma's program close to the size of the programs in Louisiana (\$150 million cap) and New Mexico (\$110 million cap). Louisiana and New Mexico have comparable population and average wage rates to Oklahoma's

¹¹ <https://www.bea.gov/industry/input-output-accounts-data#supplemental-estimate-tables>

¹² IO-Snap includes Legal Services (NAICS 5411) and Computer Systems Design and Related Services (NAICS 5415), with the remainder of Professional, Scientific, and Technical Services (NAICS 541) appearing to be reflected in Miscellaneous professional, scientific, and technical services.

¹³ Among five other sub-sectors of Professional, Scientific, and Technical Services (NAICS 541) (not shown), the only correlation coefficient over 0.5 with NAICS 51211 is Specialized Design Services; the direct requirements coefficient though is one-tenth of that for NAICS 5419.

and are perceived as having established successful film incentive programs (Button, 2018). We contrast the predicted outcomes for Oklahoma using the IO-Snap multipliers for Oklahoma versus the average of those for Louisiana and New Mexico. Consistent with economic impact studies generally, we assume that all spending in the industry receiving incentives occurs because of the incentives (Weiner, 2009; Christopherson and Rightor, 2010; Tannenwald, 2010).

Motion Picture and Video Production (NAICS 51211) employment comprises eighty percent and seventy-four percent of Motion Picture and Sound Recording Industries (NAICS 512) employment in Louisiana and New Mexico, respectively. This approximates the likely percent that would result in Oklahoma should it expand its incentive program to the size of those in Louisiana and New Mexico. Along with comparable average wage rates in the states, this should produce first-round and induced input-output impacts in Oklahoma comparable to those predicted for Louisiana and New Mexico.

With a thirty-five percent incentive rate for spending that occurs in Oklahoma, \$100 million in incentive funds could support \$285,714,286 of in-state direct spending. Of that amount, 50.5 percent would be assumed spent on in-state labor based on other state experiences (Snead et al., 2020), producing \$144,285,714 in Oklahoma wages and salaries. Using the average income multiplier from IO-Snap for Louisiana and New Mexico (2.598) yields total (direct+indirect+induced) wages and salaries of \$374,854,286. Using a state average tax rate of 10.7% for Oklahoma, the total wages and salaries produce \$40,109,409 in revenue offsets to the \$100 million incentive expenditure, representing a 0.401 rate of return on incentive investment.¹⁴ The number of resident employees associated with the total direct spending is assumed to be 2,214 based on industry averages (Snead et al., 2020). Multiplied by the average IO-Snap multiplier for Louisiana and New Mexico of 3.202, the total employment impact is 7,090. With the net revenue cost of \$59,890,591, the net incentive revenue cost per job created equals \$8,447.

¹⁴ The average tax rate is calculated as the ratio of total state taxes as defined by the Census Bureau (Urban Land Institute, 2020) (minus corporate taxes and taxes not elsewhere classified (which include oil and gas severance taxes)) to total state wages over the 2015 to 2017 period.

Use of the IO-Snap employment and income multipliers for Oklahoma produces much less favorable outcomes. The IO-Snap income multiplier equals 1.169, which reduces the revenue offsets to \$18,047,690, for a rate of return on incentive investment equal to 0.18. Combined with a lower employment multiplier of 1.094, the lower revenue offset produces a net incentive revenue cost per job of \$33,831. The low multipliers for Oklahoma might have contributed to The PFM Group (2016) to incorrectly use NAICS 7115 as the source of direct spending rather than NAICS 512 in its economic impact analysis of Oklahoma incentives.

The much less favorable outcomes using Oklahoma IO-Snap multipliers reveals the importance of using multipliers that reflect the presence of NAICS 51211 within the aggregate NAICS 512/NAICS 5121 sectors. Estimates from both sets of multipliers are overstated though to the extent some activity would occur without the incentives. Owens and Rennhoff (2020) estimate less optimistic returns on investment and incentive cost per job based on empirical estimates of the effects of state film incentives on film spending and state-level RIMS II multipliers.¹⁵

Other things equal, not only should there be correlation across states between NAICS 51211 and the four sectors examined in Table 8, but increases in NAICS 51211 employment should increase employment in the four sectors (Rickman, 2002). Over the period of 2001 to 2019, the employment location quotients (LQs) for NAICS 51211 are strongly positively correlated with those for NAICS 7113 in both Louisiana ($r=0.62$) and New Mexico ($r=0.85$), strongly positively correlated with those for NAICS 5419 in both Louisiana ($r=0.81$) and New Mexico ($r=0.82$), and strongly positively correlated with those for NAICS 5418 in New Mexico ($r=0.64$). The NAICS 51211 LQs only become significantly positively related to those for NAICS 7115 when the LQs for six other sectors with direct requirements coefficients greater

¹⁵ The estimated rates of return on incentive investment from the study for Louisiana, New Mexico, and Oklahoma are 0.17, 0.20 and 0.13. The corresponding incentive cost per job estimates are \$20,224, \$17,807, and \$21,439. Owens and Rennhoff (2020) attribute much of the difference in estimates across states to differences in multipliers, though the closeness in estimates across the three states is difficult to reconcile given their use of RIMS II multipliers for NAICS 5121 (not provided in the study), which would be expected to vary with the dramatic divergence in composition of the sector in Oklahoma compared to the other two states.

than 0.01 for NAICS 7115 are added in a simple linear regression for Louisiana ($p < 0.05$) and New Mexico ($p < 0.10$).¹⁶ Time series movements of employment in NAICS 51211 and the four key sub-sectors examined in Table 8 for Louisiana and New Mexico mostly confirm the predictions of the input-output direct requirements coefficients and the cross-sectional correlations.

5. Summary and Conclusion

The motion picture and television industry attracts considerable attention from state and local economic developers and policy makers. The perception of its high wages, environmentally-friendly production, and footloose nature, make the film industry an attractive target for state fiscal incentives (Christopherson and Righthor, 2010). Evaluations of the efficacy of film incentives lack standardization, producing widely varying conclusions. This study attempts to define and standardize the official statistics definition of the industry for economic analysis of film incentives.

Based on analysis of detailed sector government employment statistics and an unpacking of aggregate sector state-level input-output multipliers we conclude that the sector of Motion Picture and Video Production (NAICS 51211) should be the focus in film incentive studies. But government input-output accounts only provide information at a more aggregated level that combines high-paying export-based activities, such as motion picture and television production, with lower-paying locally-based activities, such as local movie theaters. Multipliers from the aggregated sector may be highly inaccurate, particularly for the states with high shares of the low-paying locally-based activities in the aggregate sector. In states with little motion picture and television production, input-output accounts would need to be modified to reflect differing input-output linkages and wage rates. As demonstrated in our case study, multipliers from similar states with concentrations of motion picture and television production could instead be used.

¹⁶ The six other sectors are: Cable and Other Subscription Programming (NAICS 5152); Wired Telecommunications Carriers (NAICS 5171); Advertising, Public Relations, and Related Services (NAICS 5418); Performing Arts Companies (NAICS 7111); Promoters of Performing Arts and Sports and Agents for Public Figures NAICS (7113); Other Services (NAICS 8129).

Future research could focus on standardizing other aspects of assessing the impact of the film industry on state and local economies. The potential of filming to increase tourism could greatly affect the economic success of film incentives (MNP LLP, 2016). Difficulties with including tourism impacts is that there may be more than one reason to visit an area, visiting a shooting site may be substitutable with another activity in the area, and visits can be seasonal (Christopherson and Righthor, 2010). Impact studies incorporating tourism impacts then would require information on these considerations in addition to data on visitor expenditures and there would need to be standards in place to guide the collection and use of the information.

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Table 1. Summary of Economic Impact Studies

Study/State	Incentive Role Assumption	Input-Output Model/Multipliers	Revenue Feedback (ROI)/Incentive Cost Per Job (ICJ)
Camoin Associates (2019a)/New York	Spending that could “reasonably” be assumed to have occurred without the incentives, including non-qualifying spending	EMSI/Type II Employ Mult=1.98 (NAICS 512110, 512120, 512191, 512199)	ROI: \$1.08 for all jurisdictions, ICJ: fiscal surplus
Camoin Associates (2019b)/Louisiana	All spending in entertainment industry receiving credits	EMSI/Type II Employ Mult=2.74 (Six major six-digit industries)	ROI: \$0.35 average for two years; ICJ average over two years cost of \$12,895
Christopherson et al. (2006)/New York	Changes in spending after incentive adoption	IMPLAN/Type II Employ Mult=3.1 VA Mult=2.15 (NAICS 51211, 51219 and one-third of 71151)	ROI: \$0.61 based on study results and our calculations; ICJ: average over two years cost of \$3,579
Ernst and Young (2009)/New York	Credit eligible spending and change in post-incentive trend in non-qualifying spending	IMPLAN/SAM Employ Mult=2.77 Output Mult=2.26 (Film production and post-production activities) (NAICS 5121)	ROI: \$1.1 for state tax revenues and \$1.9 when New York City is included; ICJ: fiscal surplus
Georgia Tech Center for Economic Development and Research (2019)/Georgia	Estimated total qualifying spending	IMPLAN/ Output Mult=3.57 (NAICS 5121)	ROI: \$0.28; ICJ: \$13,793; based on study estimates of labor income and our tax calculations
HR&A Advisors (2012)/New York	Credit eligible spending and change in post-incentive trend in non-qualifying spending	IMPLAN/Type II Employ Mult=2.29 Output Mult=1.8 (NAICS 51211, 51212, 51219)	ROI: \$1.09 for state tax revenues and \$2.23 when New York City is included; fiscal surplus
Independent Fiscal Office (2019)/Pennsylvania	Ninety percent of the spending receiving credit attributable to incentives	IMPLAN/Type II Output Mult=1.8 (NAICS 51211, 51212, 51219)	ROI: \$0.13; ICJ: \$56,917 per full-time equivalent job

Loren C. Scott Associates (2017)/Louisiana	All certified spending of film, sound recording and live performances	RIMS II/Type II Income Mult=1.33 Output Mult=1.37 (NAICS codes covering all entertainment categories)	ROI: \$0.23 average for two years; ICJ: \$15,504
MNP LLP (2014)/New Mexico	All spending assumed attributable to incentives	IMPLAN/Type II Employ Mult=1.79 (NAICS 51211)	ROI: \$0.33 for state revenue, \$0.10 for local revenue; ICJ: \$8,519
The PFM Group (2016)/Oklahoma	All spending assumed attributable to incentives	IMPLAN/Type II five-year average Employ Mult.=1.21 Output Mult.=1.92 (NAICS 71151)	ROI: five-year average of \$0.13; ICJ: \$7,914
Popp and Peach (2008)/New Mexico	All spending of qualifying projects	IMPLAN/Type II Employ Mult=2.72 (NAICS 51211)	ROI: \$0.14; ICJ: \$13,424.99

Employ: Employment; ICJ: Dollar incentive cost per job; Mult: Multiplier; VA: Value Added

Table 2. Summary of Empirical Studies

Study	Region	Years	Industry & Outcomes Examined	Empirical Findings
Adkisson (2013)	44 states with incentives	1997-2011	QCEW Employment (NAICS 51211-51219)	A few states slightly gained in employment, while others lost employment
Swenson (2017)	Lower 48 states	1998-2011	QCEW Employment and Establishment Shares (NAICS 512110-512199)	None of the incentive variables are statistically significant for employment or establishments
Button (2018)	Louisiana, New Mexico	1998-2008	QCEW Employment and Establishments (NAICS 512110, SIC 7812)	Positive but insignificant effects on employment or establishments
O'Brien and Lane (2018)	49 states plus Washington, D.C. (excludes Iowa)	1998-2010	CBP Employment and Establishments (NAICS 5121)	Mixed evidence for incentive effects on employment and establishments; Diversity and dominance of companies increases employment, and number of establishments
Thom (2018)	Lower 48 states	1998-2013	BEA Gross State Product, Wages, Wages (NAICS 512)	Refundable credits significantly increased wages in the industry; Duration of transferrable credits increased employment; No gross state product effects
Bradbury (2019)	Georgia and North Carolina	1990-2016	QCEW Employment and Establishments (NAICS 512110)	Raw increases in employment and establishments.
Button (2019)	50 states plus Washington D.C.	1976-2017	QCEW and CBP Employment and Establishments (NAICS 512110, SIC 7812) and related industries	No evidence for meaningful positive effects on labor market indicators in the primary sectors or in related sectors
Thom (2019)	Connecticut, Georgia, Louisiana, Massachusetts, New York	1991-2017	QCEW Employment (NAICS 512110)	Statistically significant immediate effect on Connecticut; Statistically significant effect over time on Louisiana
Bradbury (2020)	Lower 48 states	2000-2015	BEA Gross State Product (NAICS 512)	No significant link between incentives and film GSP per capita

Table 3. National Sub-sector Pay in Motion Picture and Sound Recording Industries

	Employment	Share	Annual Wage
Motion Picture and Sound Recording Industries (NAICS 512)	424,508	1	\$68,104
Motion Picture and Video Industries (NAICS 5121)	407,390	0.96	\$67,484
Motion Picture and Video Production (NAICS 51211)	236,113	0.56	\$95,652
Motion Picture and Video Distribution (NAICS 51212)	7,417	0.02	\$147,975
Motion Picture and Video Exhibition (NAICS 51213)	144,234	0.34	\$14,352
Postproduction Services and Other Motion Picture and Video Industries (NAICS 51219)	19,626	0.05	\$88,659
Sound Recording Industries (NAICS 5122)	17,118	0.04	\$82,854

Source: U.S. Bureau of Labor Statistics Quarterly Census of Employment and Wages (QCEW)

Table 4. Motion Picture and Sound Recording Industries Multiplier Analysis by State

State	Output Multiplier Type II	Rank	Location Quotient	Rank	Compensation (\$)	Rank
California	2.17	1	1.55	1	107,861	1
Tennessee	2.07	2	0.62	6	51,905	6
Georgia	2.02	3	0.75	3	63,157	4
Connecticut	2.01	4	0.47	10	63,481	3
New York	1.99	5	1.12	2	95,852	2
Louisiana	1.92	6	0.48	8	41,704	9
New Mexico	1.80	7	0.68	4	56,812	5
Utah	1.79	8	0.65	5	32,262	17
Florida	1.78	9	0.33	17	47,178	8
Oregon	1.68	10	0.50	7	39,273	11
Nevada	1.63	11	0.48	9	30,580	21
New Jersey	1.49	12	0.35	14	50,950	7
Illinois	1.43	13	0.32	19	38,491	12
Massachusetts	1.38	14	0.34	15	40,381	10
Montana	1.37	15	0.33	18	29,645	24
Virginia	1.37	16	0.29	22	34,162	15
Texas	1.35	17	0.36	13	31,979	18
New Hampshire	1.32	18	0.29	23	31,581	20
Colorado	1.31	19	0.34	16	29,737	23
Arizona	1.30	20	0.39	11	25,073	31
Rhode Island	1.29	21	0.28	25	31,583	19
Michigan	1.28	22	0.29	24	29,810	22
Maryland	1.26	23	0.31	21	35,727	14
Missouri	1.26	24	0.24	32	27,565	27
South Carolina	1.25	25	0.22	39	34,028	16
Washington	1.25	26	0.37	12	27,784	26
Indiana	1.24	27	0.22	38	27,158	28
Maine	1.24	28	0.27	27	24,561	34
Minnesota	1.23	29	0.27	26	24,561	33
North Carolina	1.23	30	0.24	31	27,826	25
Pennsylvania	1.22	31	0.26	28	36,800	13
Wyoming	1.22	32	0.31	20	21,022	41
Ohio	1.22	33	0.22	37	27,053	29
Iowa	1.20	34	0.20	41	19,603	46
Wisconsin	1.20	35	0.22	35	24,525	35
Kansas	1.19	36	0.24	30	22,130	39
Idaho	1.18	37	0.23	33	18,313	47
Oklahoma	1.18	38	0.22	36	23,058	37
Vermont	1.17	39	0.25	29	20,465	42
Kentucky	1.17	40	0.21	40	23,570	36
South Dakota	1.15	41	0.23	34	20,042	44
Alabama	1.15	42	0.18	44	25,070	32
Arkansas	1.15	43	0.17	46	25,259	30
Mississippi	1.15	44	0.15	48	21,763	40
Delaware	1.13	45	0.19	42	20,130	43
Nebraska	1.12	46	0.19	43	19,767	45
North Dakota	1.11	47	0.17	45	23,003	38
West Virginia	1.10	48	0.17	47	16,309	48

Table 5. State Motion Picture and Sound Recording Industries Sub-sector Employment Shares

State/NAICS Code	5121	51211	51212	51213	51219	5122
Alabama	0.98	0.12	0.00	0.81	0.06	0.02
Arizona	0.98	0.08	0.00	0.88	0.03	0.02
Arkansas	0.97	0.15	0.01	0.80	0.00	0.03
California	0.96	0.80	0.00	0.10	0.06	0.04
Colorado	0.94	0.22	0.00	0.70	0.02	0.06
Connecticut	0.98	0.42	0.02	0.50	0.03	0.02
Delaware	0.96	0.15	0.00	0.80	0.01	0.04
Florida	0.95	0.26	0.01	0.65	0.03	0.05
Georgia	0.95	0.41	0.00	0.51	0.03	0.05
Idaho	0.99	0.05	0.00	0.93	0.02	0.01
Illinois	0.95	0.17	0.00	0.71	0.06	0.05
Indiana	0.97	0.09	0.01	0.84	0.03	0.03
Iowa	0.98	0.12	0.00	0.85	0.01	0.02
Kansas	0.98	0.07	0.00	0.90	0.01	0.02
Kentucky	0.98	0.12	0.00	0.83	0.03	0.02
Louisiana	0.99	0.80	0.00	0.19	0.01	0.01
Maine	0.98	0.14	0.00	0.81	0.03	0.02
Maryland	0.94	0.30	0.00	0.60	0.04	0.06
Massachusetts	0.97	0.21	0.04	0.67	0.05	0.03
Michigan	0.96	0.14	0.00	0.74	0.07	0.04
Minnesota	0.90	0.19	0.00	0.62	0.09	0.10
Mississippi	0.99	0.05	0.00	0.92	0.01	0.01
Missouri	0.98	0.13	0.04	0.78	0.03	0.02
Montana	0.99	0.25	0.01	0.69	0.04	0.01
Nebraska	0.94	0.06	0.00	0.88	0.00	0.06
Nevada	0.97	0.17	0.00	0.77	0.02	0.03
New Hampshire	0.97	0.40	0.00	0.56	0.01	0.03
New Jersey	0.92	0.21	0.01	0.69	0.01	0.08
New Mexico	1.00	0.74	0.00	0.25	0.00	0.00
New York	0.88	0.62	0.02	0.16	0.08	0.12
North Carolina	0.96	0.21	0.00	0.74	0.01	0.04
North Dakota	0.90	0.11	0.00	0.78	0.01	0.10
Ohio	0.97	0.17	0.00	0.77	0.03	0.03
Oklahoma	0.99	0.11	0.00	0.88	0.00	0.01
Oregon	0.95	0.37	0.00	0.54	0.04	0.05
Pennsylvania	0.97	0.20	0.01	0.74	0.02	0.03
Rhode Island	0.84	0.23	0.00	0.60	0.00	0.16
South Carolina	0.81	0.19	0.00	0.61	0.01	0.19
South Dakota	0.99	0.11	0.04	0.82	0.01	0.01
Tennessee	0.68	0.22	0.00	0.42	0.04	0.32
Texas	0.96	0.10	0.01	0.81	0.03	0.04
Utah	0.99	0.12	0.00	0.36	0.51	0.01
Vermont	0.92	0.26	0.00	0.61	0.05	0.08
Virginia	0.98	0.22	0.01	0.71	0.04	0.02
Washington	0.90	0.17	0.00	0.67	0.05	0.10
West Virginia	1.00	0.05	0.00	0.95	0.00	0.00
Wisconsin	0.91	0.14	0.00	0.74	0.03	0.09
Wyoming	0.99	0.12	0.00	0.87	0.00	0.01

Source: Year 2016 Unsuppressed CBP employment from the W.E. Upjohn Institute for Employment Research (Bartik et al., 2018)

Table 6. Multiplier Correlation Analysis for Motion Picture and Sound Recording Industries (NAICS 512)

	Compensation	LQ	NAICS 5121	NAICS 51211	NAICS 51212	NAICS 51213	NAICS 51219	NAICS 5122	Multiplier
Compensation	1.00	0.91	-0.22	0.79	0.19	-0.81	0.10	0.22	0.85
LQ	0.91	1.00	-0.15	0.75	0.07	-0.81	0.28	0.15	0.84
NAICS 5121	-0.22	-0.15	1.00	-0.04	0.12	0.29	0.04	-1.00	-0.23
NAICS 51211	0.79	0.75	-0.04	1.00	0.03	-0.90	-0.03	0.04	0.75
NAICS 51212	0.19	0.07	0.12	0.03	1.00	-0.04	-0.02	-0.12	0.10
NAICS 51213	-0.81	-0.81	0.29	-0.90	-0.04	1.00	-0.32	-0.29	-0.83
NAICS 51219	0.10	0.28	0.04	-0.03	-0.02	-0.32	1.00	-0.04	0.27
NAICS 5122	0.22	0.15	-1.00	0.04	-0.12	-0.29	-0.04	1.00	0.23
Multiplier	0.85	0.84	-0.23	0.75	0.10	-0.83	0.27	0.23	1.00

Note: The NAICS variables are the sub-sector employment location quotients. LQ denotes location quotient for NAICS 512; Compensation is the annual average compensation in NAICS 512 from IO-Snap ;Multiplier is the Type II output multiplier from IO-Snap.

Table 7. Multiplier Decomposition for Motion Picture and Sound Recording Industries

	Arizona	California	Georgia	Louisiana	New Mexico	New York	Oklahoma	South Carolina	US
First Round	0.095	0.357	0.316	0.377	0.346	0.357	0.062	0.09	0.367
Indirect	0.03	0.174	0.141	0.159	1.134	0.165	0.017	0.027	0.216
Induced	0.172	0.639	0.557	0.382	0.323	0.472	0.096	0.136	0.892
Type I	1.124	1.531	1.457	1.536	1.48	1.521	1.079	1.117	1.583
Type II	1.296	2.169	2.015	1.917	1.803	1.993	1.175	1.253	2.475
Motion picture and sound recording industries	0.031	0.12	0.105	0.127	0.116	0.12	0.02	0.03	0.123
Miscellaneous professional, scientific, and technical services	0.015	0.057	0.051	0.061	0.056	0.057	0.01	0.015	0.059
Performing arts, spectator sports, museums, and related activities	0.012	0.045	0.033	0.047	0.043	0.045	0.008	0.011	0.046

Table 8. First-Round Correlation Analysis

	NAICS 51211	NAICS 5418	NAICS 5419	NAICS 7113	NAICS 7115
NAICS 51211	1.00	0.67	0.27	0.52	0.66
NAICS 5418	0.67	1.00	0.83	0.94	0.86
NAICS 5419	0.27	0.83	1.00	0.92	0.80
NAICS 7113	0.52	0.94	0.92	1.00	0.88
NAICS 7115	0.66	0.86	0.80	0.88	1.00

Note: The NAICS variables are sector employment location quotients.

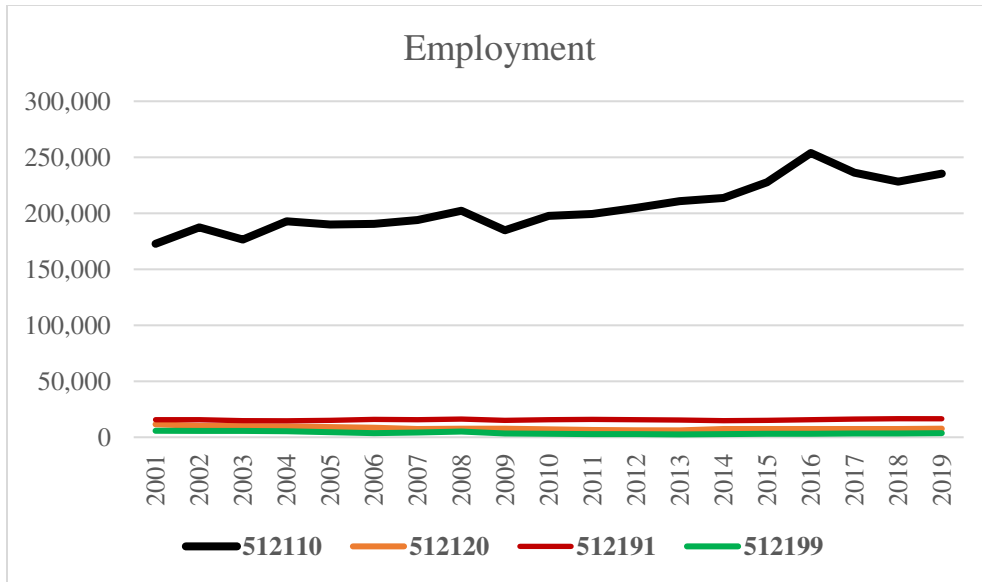


Figure 1. U.S. NAICS Motion Pictures and Video Industries Six-Digit Sectors QCEW Employment

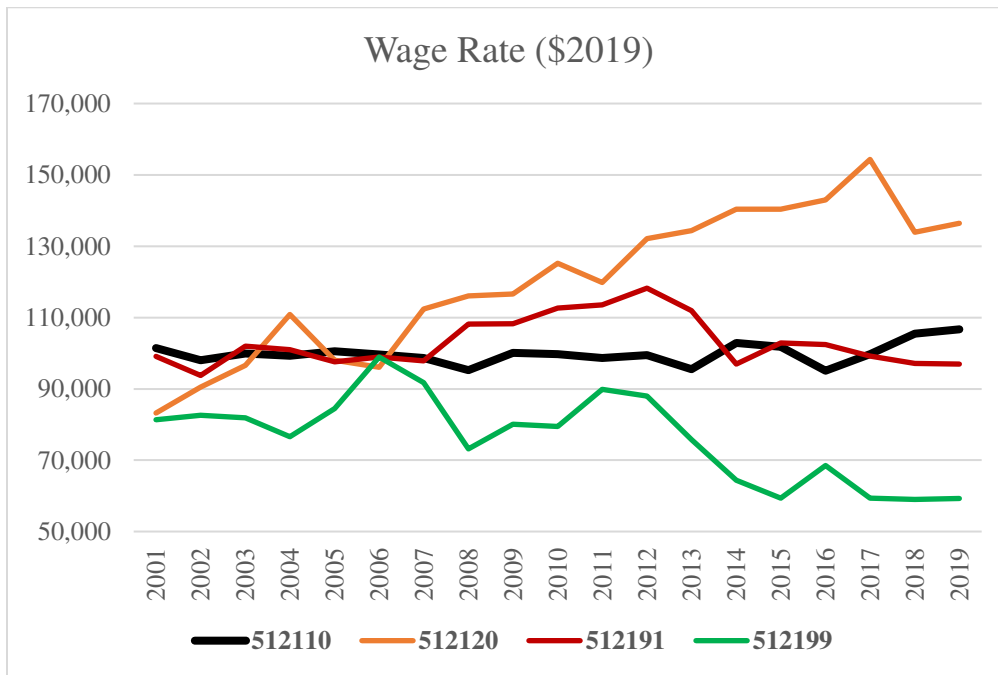


Figure 2. U.S. NAICS Motion Pictures and Video Industries Six-Digit Sectors QCEW Annual Wage Rate (\$2019)