Additional Concerns About O'Brien and Lane's Article on Film Incentive Programs

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LINK TO ABSTRACT

In this note, we follow up on the exchange between John Charles Bradbury, Nina F. O'Brien, and Christianne J. Lane in the March, 2020, issue of *Econ Journal Watch*. The exchange highlighted a disagreement by Bradbury with O'Brien and Lane regarding the benefits and economic impact of state film incentive programs. During the last three decades or so, such programs have become very popular in the United States. As a result, a small but steady stream of academic research has emerged to examine the effects (or net effects) of such programs on accepted measures of economic activity.

Two of the authors of the present note, Hilde Patron and William J. Smith, participated several years ago in a study by the Georgia Department of Audits & Accounts that evaluated the economic impact of the Georgia Film Tax Credit. As with most other academic studies of its kind, that study (**link**) found that the film credit's return on investment and its economic impact to Georgia had been significantly overstated by the Georgia Department of Economic Development.

Building on the exchange involving O'Brien and Lane's (2018), Bradbury (2020), and O'Brien and Lane (2020), we conclude that O'Brien and Lane's (2018) statistical results should be viewed as doubtful. In this note, we explain in more detail how O'Brien and Lane's construction of their key independent variable *Incentives(millions)* likely underestimates the standard errors of their coefficients and affects the significance of their results. We focus on some inconsistencies in

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O'Brien and Lane's work, the significance of which is reinforced by some publicly available data that is new to this discussion. O'Brien and Lane have not made their dataset public, which made the efforts by Bradbury and ourselves to assess their work more difficult. But central to our comment is a data point that did emerge, late in the discussion, namely, O'Brien and Lane's identification, in their reply to Bradbury's comment, of "New Mexico in 2012" as the state and year in which "the highest incentive allocation in [their] dataset," a capped incentive amount of $274.9 million, occurred (O'Brien and Lane 2020, 67). The maximum data point is of substantial importance because O'Brien and Lane use its value to estimate an *Incentives(millions)* value, $300 million, that they apparently assigned to each state that had *uncapped* incentives. As we show here, there were a number of states with uncapped incentives, and so the value of *Incentives(millions)* assigned to each of those states would be quite important to O'Brien and Lane's results. It cannot even be that the $274.9 million figure upon which that estimate is based could have come from New Mexico for 2012—that year is not within O'Brien and Lane's sample period of 1998 to 2010; New Mexico did not have capped legislative allocations during the sample period; and, in any event, starting in fiscal year 2012, New Mexico's yearly legislative allocation was capped at $50 million.

Background

In the journal *Regional Studies*, O'Brien and Lane offer a "comprehensive, longitudinal overview of project-based [film] incentive programmes as they developed over and across the United States as a whole" (2018, 872). They developed "longitudinal linear mixed-effects models, centred around [film industry] incentive introduction in each state" (ibid., 865). They drew data from:

> …the Internet Movie Database (IMDb), an online database of film, television and other entertainment products and the actors, crew and organizations who create them (see http://www.imdb.com/). Between 1998 and 2010, all English-language feature films appearing in IMDb which were produced and distributed in the United States were recorded, as were shooting locations and the names, addresses and screen credits of all companies participating in each film's production. In total, 9056 films met these criteria, with 13,138 companies collaborating on their production.
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> Incentive data were collected from states' departments of economic development, film and television commissions, and the official record of incentive legislation. Additional data from the US Census Bureau provided annual national and state-level gross domestic product (GDP), number of film industry workers and number of film industry establishments by state (US

Census Bureau, 2012). (O'Brien and Lane 2018, 868)

Their study found:

> …consistent trends despite [the] sizeable variation in film incentives from state to state and over the 13-year observation period, specifically that economic development outcomes are related not only to the presence and value of financial incentives but also to the ecological factors organizational diversity and presence of dominant firms.
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> These analyses show that the introduction of incentives in any amount is associated with a 37% increase in the number of films produced, a 17% increase in employment and a 19% increase in new firms. However, while each additional US$1 million spent on incentives increases the number of films shot in-state by 2.6%, it is also associated with decreases in employment(-4.2%) and the new firm establishment (-3.4%). (O'Brien and Lane 2018, 872)

In "Do Film Incentive Programs Promote Economic Activity? A Comment on O'Brien and Lane," Bradbury (2020) observed that O'Brien and Lane's findings appeared to run contrary to what he perceived to be an academic consensus regarding film incentive programs. "Using a variety of samples and empirical methods", he wrote, "most studies have found little to no positive net impact of film incentives on economic activity (e.g., employment, industry establishments, and output), which indicates film incentives are ineffective as economic development policy" (Bradbury 2020, 56). Bradbury then expressed his concerns about "the accuracy of the data and interpretation" which he felt "need to be answered before the results of O'Brien and Lane (2018) can be relied upon for evaluating film incentives as a policy tool" (Bradbury 2020, 63).

In "Reply to Bradbury: Effects of Economic Incentives in the American Film Industry," O'Brien and Lane write:

> …the impact of [film] incentives are relatively small for all dependent variables [*Industrial Activity*, *Employment*, and *Establishment*]. We found that simply offering an incentive of any value has significant effects on outcomes, but that offering more money did not promote better outcomes, except for filming, the shortest-term gain and one which may not promote longer-term local economic development. This is important for policy makers, who may find that small incentives are just as effective as large ones in terms of promoting filming activity, employment in filmmaking, or the establishment of film-specific firms.
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> These results do not run "contrary" to academic consensus, nor do we quarrel with J. C. Bradbury's claim that our paper "does not present itself as providing strong support for incentive programs." (O'Brien and Lane 2020, 66–67)

New concerns

In this article, we focus on O'Brien and Lane's descriptions of—and decisions regarding—their independent variable *Incentives(millions)*. O'Brien and Lane wrote:

> *Incentives(millions)*. States use a variety of instruments to promote economic development. The combination and level of incentives varies dramatically from state to state. However, *all* states targeting the film industry include a tax credit on in-state spending on goods, services, and wages as their primary tool (Chianese et al., 2012). The size of an incentive is the allocation a state's legislature earmarks for a programme, specified in the state budget. Capped allocations ranged from less than US$100,000 to US$274.9 million per year. Capturing the level of resource munificence, the variable *Incentives(millions)* reflects the US dollar amount a state committed to film incentive programs per year (in millions). (O'Brien and Lane 2018, 868)

In examining film incentive programs, O'Brien and Lane use "legislative allocations," and we follow suit. In this context, a "legislative allocation" refers to a legislative authorization; actual utilization and resultant government spending/tax credits typically will be different—and most likely less—than the allocation amount for that year. In other words, what is 'allocated' in an allocation is not governmentally expended dollars, but authorizations to expend dollars.

O'Brien and Lane use *actual* allocations for states with legislatively capped allocations and *estimated* allocations for states without legislatively capped allocations. They begin with the reasonable notion that a state with an uncapped legislative film incentive allocation, *ceteris paribus*, should "signal more munificence" to filmmakers than one with a capped legislative film incentive allocation. After consulting with "film commission informants," O'Brien and Lane valued "uncapped incentives…at US $300 million, reflecting a 10% increase over the highest incentive offered." Stated alternatively, to *estimate* the value of film incentives for those states with *uncapped* legislative allocations, O'Brien and Lane simply multiply the *actual* allocation for the state with the highest *capped* film incentive legislative allocation by 1.1. O'Brien and Lane are vague regarding whether this amount is computed on a yearly basis or whether one amount is computed and used for all years in the sample period.

In their reply to Bradbury, O'Brien and Lane (2020, 67) make the following statement:

> The highest incentive allocation in our dataset was $274.9 million (offered by New Mexico in 2012).

This statement cannot be correct. First, the dataset itself relates to the period from 1998 to 2010. However, they claim that the data point they use relates to 2012. We don't imagine that O'Brien and Lane would have used a data point from 2012 to construct data points for any year during the period 1998–2010. So we presume that when O'Brien and Lane wrote "2012" they meant to write another year, perhaps "2010," and that this was merely a typographical error in a parenthetical remark on their part.

Although Bradbury (2020) had mentioned New Mexico in his comment, he did not write a rejoinder to O'Brien and Lane, so he has not taken up this curious identification of the $274.9 million *Incentives(millions)* maximum as having come from "New Mexico in 2012." However, we sure noticed it, and here we make the case that the figure O'Brien and Lane use is incorrect and that this mistake should undermine confidence in the results of their original study. In his comment, Bradbury (2020, 61) coincidentally did set out the history of New Mexico's film incentives program: "New Mexico instituted its uncapped film tax credit program in 2002…New Mexico imposed a $50 million cap on its program in 2012." We have verified that these two statements are correct.[4] And so, whether O'Brien and Lane meant to write 2012, 2010, or some other year, if New Mexico was at least the correct state, then they did not follow their own stated approach in constructing their independent variables for the uncapped legislative allocation states. Even for 2012, New Mexico was a capped legislative allocation state with a $50 million cap. It is unlikely that New Mexico, with a $50 million cap, would have been the state with the highest capped amount in 2012. In any event, the $50 million cap is much less than the $274.9 million amount that O'Brien and Lane indicated for "New Mexico in 2012." Further, had O'Brien and Lane meant to say *2010*, or indeed any other year in their sample during which New Mexico had an incentives program, their approach would also have been incorrect, but for a different reason: from 2002 to 2010, New Mexico was an *uncapped* legislative allocation state (and before that, it did not have an incentives program). Under O'Brien and Lane's approach, for a given year, a state with an uncapped legislative allocation cannot be used to estimate legislative allocations for other uncapped states. Either way, for either year, using New Mexico to estimate legislative allocations for uncapped states would be incorrect.

To illustrate the important consequences this data point would have for O'Brien and Lane's results, we bring to bear fiscal year 2010 data contained in Appendix Table 1 of a study authored by Robert Tannenwald (2010) for the Center on Budget and Policy Priorities. We adapt parts of Appendix Table I to reflect O'Brien and Lane's stated approach for estimating the independent variable

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4. See, for example, MNP LLP (2014, 7–8).

Incentives(millions) for those uncapped legislative allocation states.

We use 2010 data for two reasons. First, it is readily available. In his Comment on O'Brien and Lane, Bradbury (2020, 58) mentioned that he contacted O'Brien and Lane seeking access to their "database of film incentive programs and spending," but they refused. Second, Tannenwald's 2010 data represents the last year in O'Brien and Lane's study sample. Given that legislative allocations in this area have grown dramatically between 1998 and 2010, we think that the "$274.9 million" amount used by O'Brien and Lane can be presumed to correspond closely to 2010, the last year in the period.

Using Tannenwald's numbers, for fiscal year 2010, the low end of the *Incentives(millions)* independent variable's range should be $0 given that Arkansas, Idaho, Kansas, and Maine each had a film incentive program but no legislative allocation for that year. Regarding the high end of this range, Appendix Table 1 of a report by the Center on Budget and Policy Priorities (Tannenwald 2010) lists the dollars appropriated—also known as legislative allocation—in fiscal year 2010 for each state with a film incentive program and a *capped* legislative allocation. Accordingly, we will keep each of these amounts as-is for the *Incentives(millions)* variables. For each state with a film incentive program and an *uncapped* legislative allocation—a so-called "open-ended subsidy" state—the Tannenwald (2010) table uses the dollar amount *claimed* (typically by production companies or by those who acquired tradable credits) in fiscal year 2010. Here, using O'Brien and Lane's approach, we will need to replace each of these amounts with an *estimated* legislative allocation.

Tannenwald (2010, 11–14) lists 43 states with a film incentive program for fiscal year 2010; of these, *twelve* had an uncapped legislative allocation: Connecticut, Georgia, Hawaii, Illinois, Iowa, Louisiana, Massachusetts, Michigan, Montana, New Mexico, North Carolina, and Pennsylvania.[5] After excluding Iowa, this means that among states with an incentives program, 26 percent of them would take on the O'Brien and Lane 'guesstimated' value for uncapped incentives programs, the maximum value for *Incentives(millions)*, the $300 million figure that was estimated by multiplying the mysterious $274.9 million by 1.1.

O'Brien and Lane, in calculating their statistics, excluded Iowa; accordingly, we will follow suit. Because California and New York represent the lion's share of the film and entertainment industry—the "dominant outliers"—O'Brien and Lane calculated their statistics first by including California and New York, and then by excluding them both.[6] Interestingly, the highest capped legislative allocation in

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5. In their study, O'Brien and Lane (2018, 868) observed that in "several" states, legislative bodies chose to install incentives without capping allocations.
6. O'Brien and Lane (2018, 871) wrote: "As a check the analyses described above were repeated with data

2010 as reported by Tannenwald was $350 million for New York—higher than the $274.9 million that O'Brien and Lane (2018) report as being the maximum for any state in any year 1998–2010. Presumably, O'Brien and Lane should have used $385 million ($350m × 1.1) for the uncapped legislative allocation states for 2010 when the data for California and New York *are* included.

When we include California and New York, and therefore assign $385 million as the value of *Incentives(millions)* for every uncapped state, we find that 84.7 percent of the summed value of *Incentives(millions)* in 2010 would come from the uncapped states, that is, from the estimated, assigned figures. In our second calculation, when we exclude both California and New York, the estimated, assigned figures comprise 91.3 percent of the summed values of *Incentives(millions)* in 2010.

That result illustrates how O'Brien and Lane's procedure would tend to overstate the legislative "munificence" coming from those states with uncapped legislative allocations. To give but one example: in our first calculation, California (a capped state) had 2 percent of total so-called allocations, and New York (another capped state) had 7 percent of total so-called allocations. However, Montana (an uncapped state), by most measures not a powerhouse in the film and entertainment industry, had *7.7 percent* of total so-called legislative allocations.

Aside from the problematic estimation procedure that O'Brien and Lane use to fill in allocation amounts for uncapped film incentives states, their use of estimated or generated regressors creates additional sampling variance for the estimated regressor on top of that which is generated by the regression itself. This will lead to the standard errors from the regression equation being too small. O'Brien and Lane do not appear to take this additional sampling variance into account in their estimation, nor in their inference.

Using O'Brien and Lane's method of estimation, it is unclear whether taking into account this additional sampling variance would be feasible, as these estimates would have no variance. Furthermore, even assuming it would be feasible to account for the additional sampling variance for the generated regressor, this would only serve to further dilute the statistical significance of the variable of interest (Pagan 1984). In any event, if feasible, the likely result of such an exercise, in our opinion, would be to turn a weakly significant variable—such as the *Incentives (millions)* variable used by O'Brien and Lane—into an insignificant one.

As alluded to earlier, another issue with O'Brien and Lane's study is its lack of transparency. Neither O'Brien and Lane's original article nor their reply to

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from California and New York excluded. For the dependent variables *Employment* and *Establishment*, the interpretation of the results is unchanged. However, for the dependent variable *Industrial Activity* excluding California and New York makes a substantive difference."

Bradbury cite their original source for the $274.9 million legislative allocation maximum value they attribute to "New Mexico in 2012." One of our co-authors searched online trying to find any information about New Mexico film incentives and an amount of $274.9 million. He did turn up a chart on page 8 of the state-sponsored New Mexico Film Production Tax Incentive Study (MNP LLP 2014) that does contain the amount of $274.9 million; however, this amount is the *direct production spending*—that is, not the amount of government incentives, but the amount expended by the producers of film and television—in New Mexico for fiscal year 2008.

That of course may be a mere coincidence, but it is worth reflecting on the differences among the amounts spent to produce film and television, the amounts allocated by state governments for incentives, and then the amounts actually claimed by the producers and therefore actually spent by the state governments in incentives. O'Brien and Lane (2020, 67) chide Bradbury for "incorrectly and repeatedly" stating that O'Brien and Lane's "measure for incentives documents state *spending* on film incentives." There indeed can be significant differences between the legislative allocations and the amounts claimed (tax incentives/credits) and provided by a state in a given year. For instance, there can be timing differences. Consider the following: During the six-year period 2005–2010, a grand total of approximately $508,000 in film incentives had been claimed in Montana, which, at the time, was an uncapped legislative allocation state.[7] Of this amount, the actual film tax incentives claimed in Montana for 2010 amounted to $28,697. Using O'Brien and Lane's approach with a $300 million amount as their *Incentives(millions)* independent variable for Montana for 2010 would result in a surprisingly large timing difference. Further, assigning $300 million as the *Incentives(millions)* value for Montana for any year during the period 1998–2010 makes little sense given Montana's actual historical spending on film/entertainment tax credits, as well as other factors unique to Montana.

Under O'Brien and Lane's approach, the estimated legislative allocation is the same amount for each uncapped state. In effect, this assumes that one uncapped allocation state signals the exact same amount of legislative "munificence" to filmmakers for that year as any other uncapped allocation state. In 2010, the film incentive programs of most of the uncapped legislative allocation states—Connecticut, Georgia, Hawaii, Illinois, Iowa, Louisiana, Massachusetts, Michigan, Montana, New Mexico, North Carolina, and Pennsylvania—differed in significant respects from each other. These differences include but are not limited to the

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7. This information comes from a "performance audit" conducted for the Montana legislature (**link**). We could not find any publicly available film incentives data for Montana for 2011 through 2014. On January 1, 2015, Montana's uncapped allocation film incentives program ended.

definition of 'filmmaking costs' upon which film incentives are based, the film incentive credit percentage itself, the transferability of film incentive credits, and the existence of credit carrybacks and/or carryovers in a given state.

Conclusion

O'Brien and Lane should make all of their data publicly available so that their work can be properly examined. Also, they should provide more detailed information for each of the years involved in their study, including the names and allocation amounts of each capped/uncapped film incentives state along with the lower and upper ranges of the *Incentives(millions)* independent variable. Researchers and tax policymakers must have greater transparency from O'Brien and Lane if they are to make any use of their findings. Based on our concerns about the *Incentives(millions)* independent variable as described by O'Brien and Lane, absent access to their data, we do not have confidence in the results of their study.

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