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KINO INDUSTRIJOS PANAUDOJIMAS EKONOMIKOS AUGIMUI: LIETUVOS MOKESTINĖS LENGVATOS KINO GAMYBAI EFEKTYVUMO VERTINIMAS	HARNESSING THE FILM INDUSTRY FOR ECONOMIC GROWTH: EVALUATING THE EFFECTIVENESS OF LITHUANIA'S FILM PRODUCTION TAX INCENTIVE
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INTRODUCTION

Relevance of the topic. The shifting global economy, characterized by digitalization and industrial transformations, offers novel opportunities for smaller nations to build competitive advantages in non-traditional sectors. Within this "new economy," where value is increasingly derived from knowledge and creativity, the Cultural and Creative Industries (CCIs) are now recognized as significant drivers of sustainable economic development and regional growth (Kalfas et al., 2024). The European Union has firmly placed the creative economy at the heart of its strategy for innovation and high-value job creation, acknowledging that these sectors often outperform traditional industries in terms of economic growth (Titan, Voineagu, & Todose, 2008; European Commission, 2016). The film industry, as a core component of the CCIs, represents a particularly powerful vehicle for generating foreign direct investment, fostering skills development, and enhancing a nation's international profile (Olsberg-SPI, 2014).

For Lithuania, harnessing the potential of its film industry can be not merely an economic opportunity, but a strategic imperative, so called "soft power" (Olsberg-SPI, 2014). In the current geopolitical context, economic resilience and diversification away from traditional industries are paramount. Developing high value, export oriented service sectors like film production offers a path toward sustainable growth that is less susceptible to regional supply chain disruptions. Following a difficult post-Soviet transition, the Lithuanian film industry has recently undergone a significant revival, spurred by targeted state support such as the film tax incentive introduced in 2014 (Dabrovolkskas, 2022; Mitkus & Nedzinskaitė-Mitkė, 2017). This success has created a momentum, attracting international productions and investment. However, it has also exposed critical weaknesses, such as a lack of modern studio infrastructure and intense regional competition (Vilnius Film Office, 2023; KEA, 2018). Lithuania, therefore, stands at a pivotal moment where strategic, evidence-based decisions are required to convert initial success into a durable, long term competitive advantage.

The novelty of the thesis. Despite the clear potential, there is a lack of rigorous, context specific economic analysis to guide Lithuania's strategy. The existing Lithuania's film industry researches are focusing on descriptive analysis, rather than econometrical tools to see real growth patterns and causality relations. The most recent analysis found about Lithuanian film industry growth and tax incentive effectiveness is from 2018 implemented by KEA ordered by the Lithuanian film centre. The analysis suggests that compared to other European countries, Lithuanian tax incentive is not advertised enough, very bureaucratic and industry itself lacks

infrastructure and enough skilled professionals (KEA, 2018). The Lithuanian government adjusted the tax incentive, that was introduced in 2014 from 20% tax rebate, to 30% in 2019, but no further investigations on its effectiveness for industry growth and impact on Lithuanian economy were made and existing reports are not focusing on the causality relations (KEA, 2018).

The level of exploration of the topic. The existing international literature on the economic impact of the film industry, while extensive, is heavily concentrated on large, mature markets like the US, UK or France or. As the theoretical review in this thesis demonstrates, the findings from these studies are not directly rigorous econometric evaluation of tax incentives similar to Lithuanian. Other European countries are also relying more on descriptive analysis and usually calculating the multiplier effects of the film industry, proving that this industry is important to a country's economy (Olsberg-SPI, 2014). Because of lack of causality research, policies that other countries adopted may be not directly transferable to the unique economic history and structure of a smaller nation like Lithuania. Furthermore, only few international studies focus on establishing causality of this sector growth, for example, Rickman & Wang (2023), who applied the Synthetic Control Method to analyse US state film incentives.

The problem of the thesis. While statistical data about Lithuanian film industry is positive and showing growth, without comprehensive film industry analysis it remains unclear whether this sector's growth is causally linked to the tax rebate or if it is a result of broader global trends. This means that without a counterfactual analysis, policymakers cannot accurately assess the true value of the applied policy and understand if additional actions need to be taken. This problem leads to the main question of the thesis: does Lithuanian fiscal incentive - tax relief for film production investment - help to grow the local film industry and is the significant factor that helps the Lithuanian film industry to become a strong film production hub?

The aim of the thesis. This thesis aim is to assess the impact of the Lithuanian tax incentive for film production on the growth of the industry.

The objectives of the thesis:

1. Systematize and define the film industry's place in Creative and Cultural Industries and it's value chains to the other sectors.
2. Systematize the theoretical and empirical literature on film industry growth policies, their effectiveness evaluation in European Union countries, other non European markets and existing studies on Lithuania about the film sector and government policy to this industry.

3. Develop a research methodology for evaluating Lithuanian tax incentive effectiveness on local industry growth based on applied methods in the literature.
4. To assess the film industry's place in the Lithuanian economy and reveal film sector linkages using Input-Output tables and sectorial multiplier evaluation.
5. Apply the econometric models to estimate the counterfactual scenario: "How would the Lithuanian film industry have performed in the absence of the tax incentive for film production?".

The methods deployed by the Master thesis. Analysis of scientific literature, systematization, generalization and comparison of theoretical insights. Leontief Input-Output analysis method to calculate sectorial multiplier effect calculations using Input-Output tables from National Accounts in Statistics of Lithuania. Interrupted time series model is used to see if there is change in film sector growth around the year 2014 in multiple countries. Econometric models: TWFE Differences-in-Differences and Synthetic control models are used to estimate the counterfactual scenario. The data is processed and methods are applied using the RStudio program.

The use of artificial intelligence (hereinafter – AI). The parts of thesis text (sentences, parts of paragraphs) are edited using the Grammarly program to keep clear style and grammar.

The description of the structure of the thesis. The master's thesis consists of three main parts. The first part analyses the concept of Cultural and Creative Industries and film industry. Later literature is reviewed on how economic impact of the film industry is assessed, the case studies of country policies and tax incentives for film industry growth are reviewed. Finally, Lithuanian tax incentive for film production is described and its effectiveness evaluation studies reviewed. The second part creates an empirical research model for a structured assessment of the Lithuanian tax incentive for film sector growth. The third part evaluates the Lithuanian film industry growth and tax incentive for its growth through multiple methods applied and results are described. The paper concludes with conclusions and suggestions for future research and policy formulation based on the literature analysis, methodology, and empirical research results.

1. THEORETICAL ANALYSIS OF THE ECONOMIC IMPACT OF THE FILM INDUSTRY GROWTH

1.1. The film industry as a constituent part of the creative industries

To understand the film industry as an economic engine, first it is needed to see where it fits into the bigger picture of the Cultural and Creative Industries (CCIs). There is not one single definition of the CCIs that everyone agrees on, but the UNESCO framework offers a solid starting point. It defines them as "sectors of organized activity whose principal purpose is the production or reproduction, promotion, distribution and/or commercialization of goods, services and activities of a cultural, artistic or heritage-related nature" (as cited in Kalfas et al., 2024).

The European commission describes CCIs as "the biggest industries are audiovisual (TV, video games, VOD, cinema, VR/AR), music, books and press publishing, advertising, cultural heritage (museums, historical sites), performance (theatre, dance) and visual arts. In Europe, culture and creativity are regarded as a public good and may receive public support (e.g. public funds play an important role in the AVindustry or the heritage sector) while many creative entrepreneurs are driving the creative economy (e.g. music, publishing and media, architecture, design) (European Commission, 2021). Cultural education is considered part of the ecosystem" (Regulation (EU) 2021/818, 2021). EU Regulation EU Regulation (EU) 2021/818 where Creative Europe Programme (2021 to 2027) was established, describes these creative and cultural sectors as based on cultural values and artistic and other individual or collective creative expressions (Regulation (EU) 2021/818, 2021).

These definitions are quite broad, covering a lot of ground. To make it more manageable, it is helpful to use a common typology that breaks the CCIs down further. This sector usually distinguishes between three main areas building on typologies in the creative-economy literature: the arts, like painting and theatre; the cultural industries, which include film, music, and publishing; and the creative sectors, where culture provides an essential input for other fields, such as architecture and advertising (UNCTAD, 2008; Titan, Voineagu, & Todose, 2008). Within this structure, culture plays a dual role. On one hand, it can be a final product meant for consumption, like a movie or a book. On the other hand, it can be an intermediate source of creativity, feeding into the creation of functional, non-cultural goods (UNCTAD, 2008).

The European Union formally recognises the CCIs for both their cultural significance and substantial economic impact. Recent findings from the European Commission (2019) indicate that cultural and creative sectors account for around 4,4% of the EU's GDP, generate

approximately 509 billion Eur in value added annually, and provide about 12 million full time jobs. Empirical studies show that cultural and creative industries contribute positively to economic growth, and broader policy literature highlights their role as drivers of innovation and cross-sectorial spillovers into tourism, technology and education (Titan, Voineagu, & Todose, 2008; UNCTAD, 2008; OECD, 2022). Within the broader landscape of the Cultural and Creative Industries (CCIs), the film industry holds a particularly prominent position, owed to its powerful blend of cultural expression and economic weight. EY's Cultural Times study, commissioned by CISAC (2015), shows that, within the 11 cultural and creative industry sectors it analyses, television and film account for a significant share of global CCI revenues and employment, describing CCIs as "catalysts for development" and emphasising the economic weight of screen industries. In the European Union, the strategic value of the film and audiovisual sector is consistently affirmed for both its cultural and economic contributions (European Commission, 2021; Regulation (EU) 2021/818, 2021).

The film and television industry stands as one of the core components of the cultural industries, yet it operates with a set of unique economic dynamics that set it apart. Usually, it is famously a high risk, "hit-driven" business. In what has been described as a market with an almost "infinite variance," a tiny fraction of rare blockbuster films generate the majority of revenues, subsidizing numerous unprofitable projects (De Vany and Walls, 1999, cited in Pangarker and Smit, 2013). This inherent volatility is compounded by a market structure where products have a short shelf life and are subject to unpredictable consumer trends, with films in cinema exhibition typically functioning as short-life products whose box-office revenues rise and fall rapidly within just a few weeks on screen (Izquierdo-Sanchez, 2019). For European markets in particular, this challenge is magnified by the historical dominance of Hollywood productions, which creates a significant structural barrier to the circulation and commercial success of European local films (Dabrovolskas, 2024).

But the point of view about the film as a product driving sales and generating profit only, may be limited if we are looking at the film industry from a government perspective. While a film project might not always directly recoup its investment through sales, the production process itself can generate employment, boost local service sales, and positively impact the region where it's made (Oxford Economics, 2012; Olsberg-SPI, 2014). So, countries and the European Union keep seeing this industry as an important one and keep supporting it. The numbers alone underscore its significance. According to European Commission-commissioned estimates, cultural and creative industries account for about 4,2% of EU GDP and nearly 7

million jobs (EY, 2014). Film and audiovisual activities constitute a major part of this wider ecosystem, as evidenced by their significant economic scale in Europe (European Audiovisual Observatory, 2023). Europe's production capacity is substantial: recent data indicate that roughly two thousand feature films are produced across Europe each year, placing the region among the world's top film producers alongside India and the United States (Talavera, 2017; UNESCO Institute for Statistics, 2013).

Within Europe, a handful of key markets: France with 298 films produced, Spain - 375, Italy - 402, serve as the main engines for this activity (Cineuropa, 2024; Italian Ministry of Culture, 2024). As noted by the European Audiovisual Observatory (2023), these countries collectively dominate in both production volume and market size, accounting for the lion's share of the continent's total film related revenue and employment.

The reviewed literature consistently underscores the pivotal role of the film sector within any nation's broader ecosystem of Cultural and Creative Industries (CCIs). Far from being merely an artistic or leisure pursuit, this sector acts as a significant economic engine. Specifically, it drives a notable added value to a country's economy, contributing through areas such as direct production expenditures, job creation, tourism, and the ancillary services it necessitates.

1.2. The value chain of film's lifecycle and importance of production stage

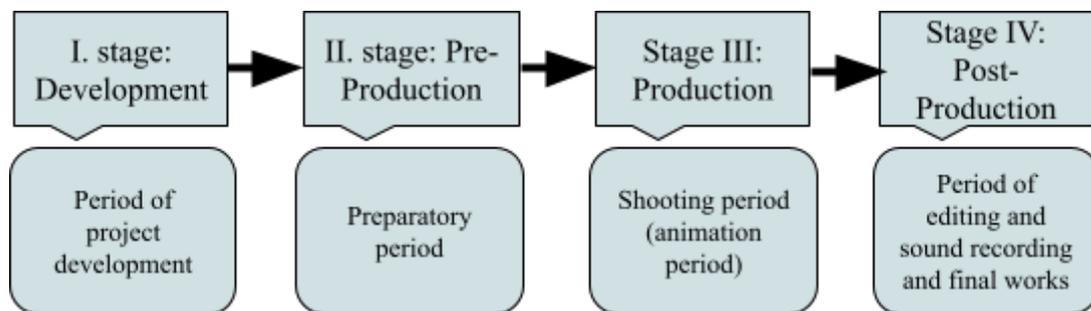
To understand how the film industry generates economic value, it is important to analyse its operational framework from the perspective of a value chain. This concept provides a map of a film's entire lifecycle, from its initial spark to the moment it reaches the audience, revealing just how deeply the industry is woven into the wider economy (Boediman, Pujawan & Baihaqi, 2024; Parc, 2020).

This chain can be understood as five stages visualized in Figure 1 below: development, pre-production, production, post-production, and exhibition (Boediman, Pujawan & Baihaqi, 2024; Łazarczyk, 2021). Damian Łazarczyk describes in the article "Costs in a Film's Production Process" (2021), it all begins with the development (or creation or planning) stage, the foundational stage focused on creative and financial planning. Later, the pre-production stage happens, this is where a script is acquired or written, intellectual property rights are secured, actors are cast, key personnel are hired, and locations are scouted and most importantly, this is the phase where the necessary financing is raised from studios, public funds, or private investors (Łazarczyk, 2021).

Next and the most important, is the production stage, the principal photography or "shooting" phase. This is typically the most expensive and resource-intensive part of the journey, often consuming the majority of a film's total budget (Łazarczyk, 2021). During this stage, a vast local supply chain is activated, creating demand for services ranging from set construction and equipment rentals to catering, transport, and accommodation (Łazarczyk, 2021). Once filming is complete, the project enters post-production, where raw footage is transformed into a polished final product. This involves a host of highly skilled technical and creative tasks, including picture and sound editing, color correction, music composition, and the creation of animation and visual effects (VFX) (Łazarczyk, 2021).

Figure 1

The film production process



Source: adapted from Łazarczyk, 2021, p. 1077, based on Clevè, 2006; Goodell, 2018; Zabłocki, 2018; Geuens, 2000.

The final stage is the distribution and exhibition stages, which concerns marketing the film and delivering it to audiences. This process unfolds across a series of windows, starting with a theatrical run in cinemas before moving to on-demand services, television, and other platforms (European Audiovisual Observatory, 2024). The success of this stage is heavily shaped by the strategies of major distribution firms, advertising budgets.

The structure of the film production creates a value chain that makes understanding that the industry's economic activity is not an isolated loop. A substantial portion of its spending, over two-thirds, according to studies, flows directly into other sectors, fuelling its extensive supply chain (Inter-American Development Bank, 2023). This deep economic integration provides the central rationale for modern policies designed to support the screen industries. In economic-impact studies, the regional effect of film activity is measured as the total of direct, indirect, and induced impacts generated by production spending across the value chain, from

development and on-location production logistics through post-production services and, in some cases, marketing and promotion (Olsberg-SPI, 2020)

In conclusion, the analysis of the film industry's value chain in literature reveals that while each phase is integral to the creative process, the physical production stage acts as the primary catalyst for economic expansion and cross-sectorial stimulation. This stage is deeply integrated with the broader economy, driving substantial direct employment and generating strong multiplier effects through large expenditures on hospitality, accommodation, construction, transport, and other local services (Oxford Economics, 2012; Olsberg-SPI, 2014). Because the production phase concentrates the highest share of immediate economic value and produces the most pronounced ripple effects within regional markets, it holds potential as a lever for national economic development (Olsberg-SPI, 2014). This is why many countries in Europe, including Lithuania, strategically prioritise this link in the value chain, deploying targeted tax incentives and fiscal policies to attract inward production investment and maximise the broader economic returns from production spending.

1.3. European countries attempt to support local film sectors in changing environment

Recognizing the cultural and creative industries as strategic sectors, including the film production sector, the European Union provides robust and multi-sided support for filmmakers. A central pillar of this support is the “Creative Europe” program, which, according to the European Commission, is designed to cultivate European audiovisual projects, improve their distribution across borders, and ultimately reinforce the continent's cultural diversity and competitiveness on the global stage (European Commission, n.d.; European Commission, n.d.). Its sub-program “Creative Europe MEDIA” empowers filmmakers by providing crucial aid for the development and distribution of audiovisual works, boosting the international profile of European films (European Commission, n.d.).

Beyond direct program funding, the EU facilitates international partnerships through initiatives like “Eurimages”. As the Council of Europe's cultural support fund, Eurimages is vital for filmmakers seeking to mount international co-productions, and it also provides support for distribution and exhibition (Council of Europe, n.d.). The co-production treaties it enables are essential for production companies looking to team up with European counterparts to increase the scale, quality, and market reach of their projects (Council of Europe, n.d.).

A third area of support is targeted for professional development. EU funded training and networking opportunities enhance the skills and international connectivity of industry

professionals. Programs like “European Film Promotion” (EFP) create valuable forums and workshops, while acclaimed training initiatives such as “TorinoFilmLab”, “EAVE”, and various other media supported workshops offer high-level training for filmmakers and producers across Europe (European Film Promotion, n.d.; TorinoFilmLab, n.d.; European Audiovisual Entrepreneurs, n.d.).

Beyond EU level support, individual countries have deployed their own strategic initiatives to bolster their film industries. Many European countries have successfully used film production as a tool for regional development, most often through targeted policies like tax credits and subsidies (Olsberg-SPI, 2014). Ireland's "Section 481" and Malta's cash rebate system, for example, have become well known for attracting major international film projects, which in turn boost their global competitiveness and deliver significant economic returns (Olsberg-SPI, 2023a; Screen Malta, 2023).

As a result, the European Union and each country individually pay attention to supporting local film productions, the analysis of the film industry must view it through a few lenses, acknowledging both its cultural worth and its economic impact (Hill 2016; De Vinck and Lindmark, 2012). It can also be seen as just a product which drives direct sales, profit, and is impacted by consumer needs and trends (Titan, Voineagu, & Todose, 2008). Historically, government support for cinema was justified by the "national cinema" model. This approach prized the cultural value of film as a means of expressing and preserving a national identity, and public funding was often granted on these non-economic grounds (Ward, 2004). However, as Ward (2004) notes, the forces of globalisation, technological change and market liberalisation have exposed the limitations of viewing film solely through a cultural lens, encouraging a shift toward a creative industries paradigm that embeds film within a broader economic development agenda (De Vinck and Lindmark, 2012; Hill, 2016).

Despite the European Union and national governments' initiatives to support the film sector, the entire sector is experiencing big change that may affect how films and series are produced. The rise of streaming platforms has fundamentally altered consumption habits of the consumers. For example, according to Lobato (2019), Netflix launched its streaming service in the United States in 2007 and then began its international rollout first to Canada in 2010, then to Latin America in 2011, to parts of Europe in 2012 and 2013 and by the middle of 2010s, it had become the world's largest subscription video-on-demand service. The rise of Netflix popularized practices of watching entire series in a row, on-demand access, and personalized algorithmic recommendations (Khazoom, 2025).

The rise of streaming platforms extended to production, where streamers are bypassing traditional adaptation processes of how the local language content is being created, to ensure portability across borders (Khazoom, 2025). Starting 2013 Netflix invested heavily in original programming, including production in around 30 national markets (Lobato, 2019). At the same time local and traditional broadcasters face challenges in certain markets, mainly inability to match the multi billion-dollar content budgets of tech giants (Chalaby, 2024; Khazoom, 2025). Streaming services are aggressively increasing their budgets and output, for example, Netflix releasing nearly 400 original shows in a single year and investing heavily in strategic production hubs (Chalaby, 2024). Consequently, this dynamic is remapping local film industries and their growth. Streamers prioritize markets offering economic advantages like tax incentives and infrastructure, thereby reshaping how local film industries perform and integrate into the global economy (Khazoom, 2025).

To summarize, creative industries, particularly filmmaking, are now viewed as significant business and economic drivers, in addition to their cultural contributions. The landscape of video production consumption is continually being reshaped by globalization and technological innovations like streaming services, prompting major companies to prioritize the creation of more profitable content. Concurrently, European Union and European countries are striving to attract production companies and bolster local filmmakers to enhance the competitiveness of their national film industries and stimulate economic growth.

1.4. Strategic state intervention: a review of policies and effectiveness assessment

The globalized nature of film production has fostered an intensely competitive environment, prompting governments worldwide to use strategic interventions to attract investment and cultivate their local industries. For small countries like Lithuania, understanding the design and outcomes of these international policy models is essential for crafting an effective national strategy. Therefore, to understand the practical application of the economic theories and methodologies discussed previously in calculating the economic effect of the industry, this section provides a case-by-case review of key international approaches. This analysis will establish a comparative context for the subsequent evaluation of Lithuania's own policies and performance.

Ireland's film tax incentive scheme, known as Section 481, is widely regarded in policy and industry analysis as one of the most attractive and effective audiovisual production incentives in Europe (Olsberg-SPI & Nordicity, 2017; Olsberg-SPI, 2023a). The incentive

provides a payable corporation tax credit of up to 32% of eligible Irish expenditure, making Ireland highly competitive for international productions while simultaneously supporting indigenous filmmaking (Screen Ireland, n.d.). Empirical evaluations indicate that many large scale international film and television projects produced in Ireland would not have occurred in the absence of Section 481, demonstrating a high level of policy additionality (Olsberg-SPI & Nordicity, 2017; Olsberg-SPI, 2023a).

Recent evaluations further highlight the structural and long term benefits of the incentive beyond immediate spending effects. According to Alma Economics (2025), Ireland's audiovisual sector supported approximately 15 899 FTE jobs and generated over 1,06 billion Eur in total GVA annually during 2021-2023, with live action production - largely supported by Section 481-accounting for the largest share of this impact. Recent policy design links the incentive to workforce development, for example through "Skills Development Plans" that encourage productions to invest in training, which require productions to invest in training and career progression for local crew (Screen Ireland, n.d.). These evaluations suggest that this design has contributed to the emergence of a highly skilled domestic workforce and has strengthened Ireland's capacity to host repeated high budget productions, thereby reinforcing the sector's sustainability and international reputation (Olsberg-SPI, 2023a; Alma Economics, 2025).

The methodology employed across these major evaluations by Olsberg-SPI (2017 and 2023) utilizes a robust Economic Impact Assessment (EIA) framework anchored in Input-Output (I-O) modelling. This quantitative approach calculates the direct, indirect, and induced impacts of production expenditure, deriving specific multipliers to measure how initial spending ripples through the wider economy. A critical component of this methodology is the assessment of "deadweight" (activity that would occur without the incentive) versus "additionality" (activity specifically triggered by the incentive), with reports typically attributing high additionality to international incoming productions (Olsberg- SPI & Nordicity, 2017). The 2023 study expands this methodological scope by integrating a "Skills Analysis," likely employing qualitative surveys and industry consultations to assess workforce gaps and training needs alongside the traditional economic metrics. Data for these comprehensive reviews is triangulated from official sources such as the Central Statistics Office (CSO), Revenue Commissioners, and direct expenditure data from Screen Ireland (Olsberg- SPI, 2023).

Malta represents a successful small nation strategy, employing a competitive cash rebate system in 2005. It was revised to increase the reimbursement for production companies from to 27% 2013, and again to 40% in 2019 of eligible expenditures, helping to secure the island's

status as a Mediterranean hotspot (Sagalytics, 2021; Malta Film Commission, 2024). The most recent evaluation of this policy finds that direct production spending of approximately 72,7 million Eur in 2022 generated about 93,8 million Eur in total Gross Value Added (GVA), a figure that incorporates direct, indirect, and induced effects, including contributions from screen tourism (Malta Film Commission, 2024).

The results demonstrate a high efficiency of public spending, with the study reporting that every 1 Eur of public cash rebate support generated 3,00 Eur in economic contribution to the domestic economy (Malta Film Commission, 2023). Furthermore, the fiscal impact was positive, for every 1 Eur spent on the rebate, the government received 1,14 Eur back in tax contributions, in total 35,7 million Eur in government revenue. In terms of employment, the industry supported roughly 800 direct full-time equivalent (FTE) jobs and a total of 1,772 FTEs once the ripple effects through the economy were accounted for (Malta Film Commission, 2023).

To arrive at these figures, the 2021 assessment “Malta Film and Production Industry Economic Impact Assessment Report” by Sagalytics and the 2023 study by Malta Film Commission utilized a quantitative incremental methodology based on Input-Output models. This approach was chosen because I-O analysis is a standard macroeconomic tool for demonstrating how an initial injection of spending cascades through the economy via Leontief demand coefficients and NACE code classifications (Sagalytics, 2021). The 2023 model specifically applied Type II multipliers, derived from Malta’s symmetric Input-Output tables and Central Bank of Malta data, to the detailed expenditure breakdowns provided by the Malta Film Commission (Malta Film Commission, 2023).

The United Kingdom, representing a mature and large scale production market, offers a foundational case study. Its film tax relief programme introduced in 2007, which allows qualifying productions to claim up to 25% of eligible UK core production expenditure, has been the subject of influential economic impact assessments that are cornerstones in the policy literature (Oxford Economics, 2012; Olsberg-SPI with Nordicity, 2015). These assessments have consistently utilized I-O analysis to provide an economy wide evaluation of the film industry’s value chain. A landmark 2012 study conducted by Oxford Economics for the British Film Institute, for example, used this methodology with national statistics to quantify the sector’s economic footprint, finding that in 2011 the UK film industry supported a total of 117 400 FTE jobs and generated over 4,6 billion pounds in GDP for the UK economy, while paying more than 1,3 billion pounds in tax revenues to the Exchequer (Oxford Economics, 2012).

A subsequent study for the UK Film Distributors' Association by Saffery Champness and Nordicity (2015) focused specifically on the UK theatrical film distribution sector. Using I-O based multipliers, it applied a GVA multiplier of 2.30 to the sector's direct GVA of 356 million pounds to estimate an additional 463 million pounds in GVA from multiplier effects, for a total GVA impact of 819 million pounds in 2013. The same analysis found that the sector supported approximately 11 100 FTE jobs in total and generated about 190 million pounds in tax revenues for the UK government in that year.

The evaluation of Norway's 25% film and series incentive finds that, despite its relatively modest scale compared to competing jurisdictions, the scheme delivers a strong return on public investment and enhances Norway's attractiveness for international production (Olsberg-SPI, 2023b). Using an I-O based methodology, the study estimates that between 2020 and 2023 the incentive supported around NOK 848 million in Gross Value Added and approximately NOK 2,1 billion in total economic output across the Norwegian economy, once direct, indirect, and induced effects are taken into account (Olsberg-SPI, 2023b). On this basis, every NOK 1 million of incentive outlay is associated with roughly NOK 4,7 million in total GVA, indicating a highly efficient use of public funds. Furthermore, survey evidence on additionality suggests that only about 7.8% of the incentivised expenditure would have occurred in Norway without the scheme (Olsberg-SPI, 2023b).

However, the evaluation also indicates that the incentive's fixed annual budget significantly constrains its impact, since demand for support regularly exceeds available funds (Olsberg-SPI, 2023b). In 2021 and 2022, unfunded or rejected applications corresponded to more than NOK 1,6 billion in potential production expenditure, creating a high risk that these projects would relocate to other countries with more accessible or better resourced schemes. Scenario modelling shows that moving away from the current "business as usual" cap through a stepped increase in the budget or a more automatic, uncapped incentive could allow the scheme to support a substantially larger level of activity, with total GVA by 2029 projected at up to around three times the level estimated under the existing capped-budget scenario (Olsberg-SPI, 2023b).

The assessment utilized a comprehensive Economic Impact Analysis (EIA) based on a quantitative Input-Output methodology to measure the flow of expenditure through the economy (Olsberg-SPI, 2023b). This model used national data from Statistics Norway and the OECD to calculate direct, indirect, and induced multipliers for key metrics such as output, GVA, and full time equivalent (FTE) jobs (Olsberg-SPI, 2023b). To provide a holistic evaluation, the study also

employed a Cost Benefit Analysis (CBA) supplemented by a "plus-minus" assessment to capture non monetizable benefits such as workforce development and cultural value that are often excluded from standard fiscal analysis (Olsberg-SPI, 2023b).

Olsberg-SPI made the evaluation of European fiscal incentives in 2014, which indicates that these schemes have successfully catalysed growth in the film and audiovisual sectors, with countries operating incentives generally showing larger and faster-growing production volumes relative to GDP than those without such schemes. The study also concludes that, in several major markets such as France and the UK, fiscal incentives are fiscally efficient, with each unit of public support leveraging multiple units of additional production investment and generating positive net tax returns, but the precise leverage ratios and GVA multipliers vary by country and scheme.

Beyond direct financial returns, the incentives have driven employment growth and higher capacity utilisation, attracting mobile international productions and fostering cross border co-productions in countries such as France and the UK (Olsberg-SPI, 2014). The report notes that while there is some indication of production shifting away from territories with less competitive offers, the dominant pattern is a net inflow of portable productions into Europe, particularly from major US studios, reinforcing the continent's production infrastructure and technical base.

The assessment employed a mixed-method approach, comparing trends in production activity between countries operating incentives and those without over the period 2009–2013, rather than using a formal difference-in-differences econometric model (Olsberg-SPI, 2014). This quantitative analysis of indicators such as production volume was supplemented by extensive qualitative research, including numerous consultations with industry stakeholders, to address major limitations in data comparability and availability across different national contexts (Olsberg-SPI, 2014). In addition, the study reviewed existing national evaluations, many of which relied on I-O models and multipliers to estimate wider economic and fiscal impacts, while emphasising that methodological differences make it difficult to standardise these results in a pan-European comparison (Olsberg-SPI, 2014).

Moving beyond tax rebates, a comparative look at the direct subsidy models in France and South Korea offers critical insights, suggesting that a policy's strategic design can be different than tax rebate scale. A comparative study by Messerlin and Parc (2017) challenges the assumption that heavy public funding guarantees industry success by analysing two fundamentally different approaches: the French model, characterised by large scale, direct state

subsidies aimed at protecting national culture, and the more limited, market oriented support historically used in South Korea. The evaluation finds that South Korea's more modest but strategically indirect support has been significantly more effective in building a globally successful film industry than France's much larger, protectionist subsidy regime (Messerlin and Parc, 2017). The authors conclude that a film industry can prosper better in the long term without significant government subsidies, implying that the strategic design and market orientation of support measures are more critical for sustainable growth than the absolute budgetary scale of the incentives (Messerlin and Parc, 2017).

To assess the long-term effects of these policies, Messerlin and Parc (2017) undertook a comparative historical analysis of industry performance in both countries from the 1970s to the present. This methodology involved tracking and juxtaposing key quantitative indicators across both jurisdictions, such as domestic market share, the number of films produced, and audience admission levels. By evaluating these metrics over a multi-decade horizon, the study isolated the impact of subsidy intensity and policy design to determine how state intervention versus market-driven strategies influenced the competitiveness and development of the respective film sectors (Messerlin and Parc, 2017).

France and South Korea represent almost opposite philosophies of state support for film. Both have successful industries, but they got there in very different ways. France operates one of the world's oldest and most extensive subsidy systems, centrally administered by the "*Centre national du cinéma et de l'image animée*" (2024). This model is defined by a circular financing mechanism where earmarked levies on cinema tickets, broadcasters, and streaming platforms are "recycled" back into the sector as funding (Messerlin and Parc, 2017). Direct support instruments are comprehensive, often layering tax credits (domestic and international) on top of direct subsidies. Key mechanisms include automatic support for producers based on previous box-office or broadcast performance, and selective funds targeting specific needs such as script development, distribution, and art-house cinemas. The overarching policy logic is explicitly cultural protectionist, aiming to preserve a distinct "national cinema" in the face of US dominance by prioritizing cultural diversity, a high volume of annual productions, and the maintenance of a dense professional ecosystem (Messerlin and Parc, 2017).

South Korea's film policy framework utilizes screen quotas to ensure domestic films secure minimum exhibition space, while heavily investing in the industry's foundational capacity through education, training, and infrastructure (such as film schools and studio facilities). The Korean Film Council (KOFIC) facilitates targeted support for co-productions, marketing, and

export promotion, but the volume of direct production funding remains significantly smaller than in high-subsidy models like France (Messerlin and Parc, 2017; KOFIC, n.d.). The underlying policy logic focuses on "enabling" rather than "sheltering"; it aims to build export-capable companies by improving business conditions and technical skills, rather than covering the majority of production costs through public funds (Messerlin and Parc, 2017).

In contrast to industry commissioned I-O reports, a growing body of US academic research takes a sceptical view of state film tax credits as tools of economic development. These studies apply panel econometric and synthetic control methods (SCM) specifically to address the limitations of multiplier-based I-O analysis and to isolate the causal effects of incentives from broader economic trends (Button, 2019; Thom, 2019; Rickman and Wang, 2023).

For example, Button (2019) departs from the standard use of I-O multiplier models by employing a rigorous quasi-experimental research design to evaluate the causal impact of US state film tax incentives. The study utilizes a national panel dataset covering the diffusion of these programs from the late 1990s onward, drawing on data from sources such as the Quarterly Census of Employment and Wages (QCEW) to measure key outcomes like employment, wages, and establishment counts. The econometric approach relies on a difference-in-differences framework that exploits the variation across states and over time in both the adoption and specific generosity of incentives (e.g., credit rates, refundability, and caps). To isolate the policy's true effect, the model includes state and year fixed effects to control for time-invariant local characteristics and national economic shocks, alongside robustness checks that examine lag structures and pre-trends to rule out false positives. The study finds that while incentives can influence filming locations, they have no meaningful impact on film-industry employment, wages, or establishments (Button, 2019).

Thom (2019) investigates the economic efficacy of state motion picture incentive (MPI) programs, concluding that they largely fail to deliver the promised economic development benefits. The study finds that neither transferable tax credits nor sales and lodging tax waivers had any sustained impact on motion picture employment or wage growth, while refundable tax credits showed only a temporary, small effect on wages that likely accrued to existing workers rather than creating new jobs (Thom, 2019). Furthermore, the analysis reveals that these incentives did not significantly increase states' market share of the national film industry or their overall motion picture Gross State Product (GSP), suggesting that MPIs are a poor use of fiscal resources for generating long-term economic growth (Thom, 2019).

To reach these conclusions, Thom (2019) employs a quasi-experimental research design using a panel dataset of US states from 1999 to 2013. The study utilizes a fixed effects regression model that controls for both time-invariant state characteristics and national economic trends, while also accounting for time-varying political and economic factors such as union density, right-to-work status, and unemployment rates (Thom, 2019). A key methodological distinction of this study is its disaggregation of "incentives" into specific policy instruments, measuring the distinct impacts of transferable credits, refundable credits, and tax waivers, and its use of actual incentive spending data to test for effects on industry-specific labor and output measures (Thom, 2019).

Rickman and Wang (2023) employ the Synthetic Control Method to rigorously assess the causal impact of state film incentives by comparing "treated" states that enacted or repealed incentives, against a carefully constructed counterfactual. For each case study, the authors create a "synthetic" control state, which is a weighted average of states from a donor pool that did not implement such incentives during the relevant period. This synthetic control is designed to closely mirror the pre-treatment trends of the treated state in key film cluster indicators like employment and establishments. By isolating the post-treatment divergence between the actual state and its synthetic counterpart, the study filters out broader national economic trends and pre-existing agglomeration forces, allowing for a robust estimation of whether the incentives truly created or sustained film clusters (Rickman and Wang, 2023). Study finds weak evidence that they sustain broader film cluster growth (Rickman and Wang, 2023).

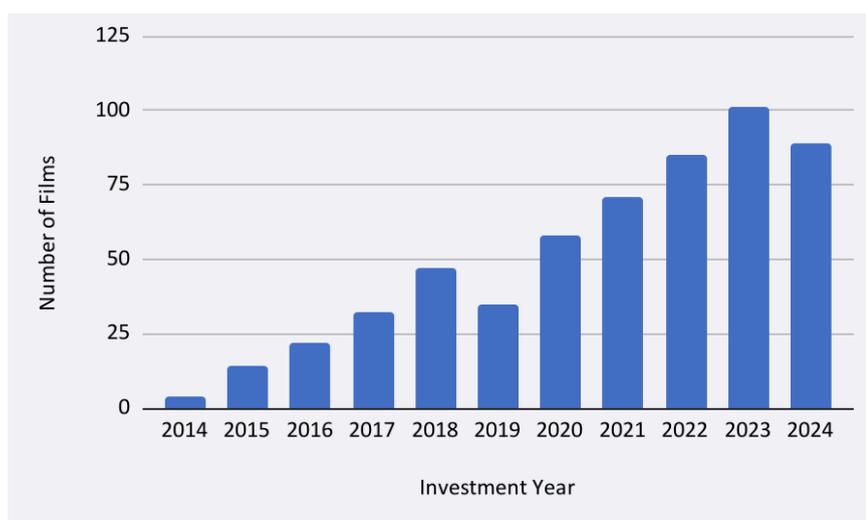
Reviewed literature reveals a clear pattern in Europe: most countries utilize tax rebate incentives for film production and assess the outcomes using descriptive, ROI-based, and Input-Output (I-O) methods, which include multiplier calculations. Notably, a significant portion of these studies are conducted by Olsberg-SPI, employing a similar methodology that allows for comparable results across cases. All reviewed European cases have shown positive economic impacts on both the film industries and the respective national economies. Conversely, in the United States, specific policy instruments have been evaluated using econometric models. These models suggest that state-level film incentives are often an expensive and inefficient development strategy, raising serious concerns about the high public cost associated with each job created.

1.5. Lithuanian government actions to support film industry

Despite being in the European Union the story for Lithuania is different. The general challenges facing any small film industry were magnified by the country's turbulent history. After the Soviet Union's collapse in the early 1990s, the Eastern European film industries was plunged into crisis, facing "massive cuts and withdrawal of secure funding" (Dabrovskas, 2022). This transition created a deeply precarious environment. State owned entities like the Lithuanian Film Studio, once the heart of production, were suddenly grappling with obsolete equipment, mounting debts, and an inability to finance new national films, all while facing aggressive competition for international production services (Dabrovskas, 2022; Mitkus and Nedzinskaitė-Mitkė, 2017). Unlike larger Western European nations with stable, long established industry structures, Lithuania had to rebuild its commercial film sector and its very sense of a national cinema identity almost from scratch (Lithuanian Film Centre, 2004; Ingvaldstad, 2010). This difficult historical backdrop is important for understanding why strategic state intervention became so important. The eventual creation of targeted policies, most notably the establishment of the Lithuanian Film Centre and the introduction of a film tax incentive, proved essential not just for growth, but for the industry's fundamental survival and its ultimate revival in the 21st century (Lithuanian Film Centre, n.d.; KEA, 2018). Over the last few years, Lithuania's film industry has been thriving, and many high profile international productions (Netflix & HBO) selected Lithuania to produce films (Lithuanian Film Centre, n.d.c).

Figure 1

The number film projects yearly utilizing Lithuanian tax incentives (2014-2024)



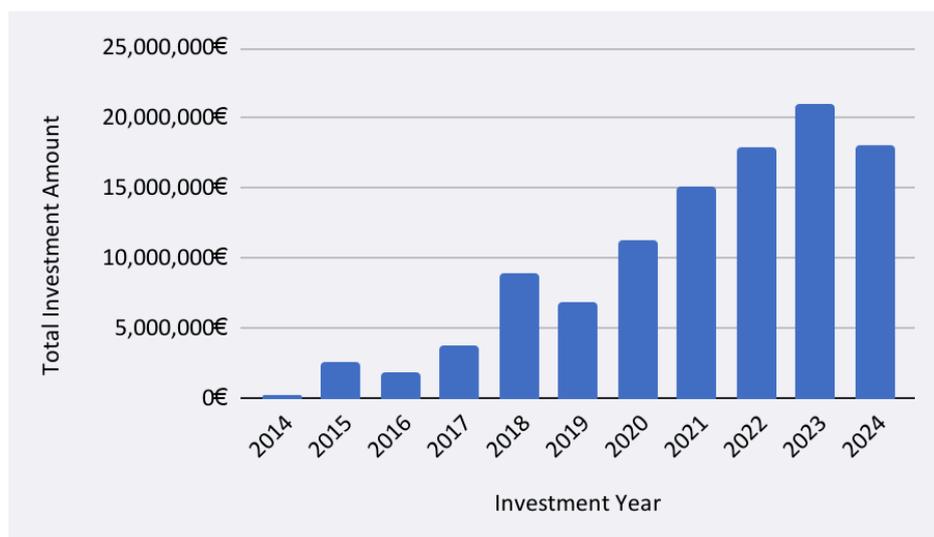
Source: adapted from Lithuanian film centre, n.d.c

Lithuania has followed a similar path as other European countries and introduced tax incentive for film production (KEA, 2018). While its tax incentive is a cornerstone of its policy, the government has also implemented broader strategic measures aimed at strengthening the audiovisual sector's infrastructure, elevating professional skills, and fostering overall industry growth (UNESCO, n.d.; KEA, 2018). This domestic support is amplified by active collaboration with European partners and participation in EU-funded programmes such as Creative Europe MEDIA and various Interreg projects, as well as Lithuania's membership of Eurimages (Lithuanian Culture Institute, n.d.; Cineuropa, 2007).

The Lithuanian tax incentive itself, first introduced in 2014, has been particularly effective in raising the country's profile as a filming destination (Lithuanian Film Centre, n.d.b) The scheme began as a 20% rebate on eligible expenses but was made significantly more competitive in 2019 when it was increased to 30%, providing a substantial boost to film production investment in the country (KEA, 2018; Lithuanian Film Centre, n.d.c). In 2019 only 35 films used tax incentives with total investment of 6,83 millions Eur and 2020 investment almost doubled to 11,29 millions Eur with 58 films produced in Lithuania (Lithuanian Film Centre, n.d.c). Recent years remain stable with investment varying from 17 to 21 millions euros per year with the number of produced films from 85-101 (Lithuanian Film Centre, n.d.c). Figure 1 and Figure 2 below show number of film projects per year and total investment amount over the years of film projects utilizing Lithuanian tax incentives.

Figure 2

Total investment amount over the years of film projects utilizing Lithuanian tax incentives (2014-2024).



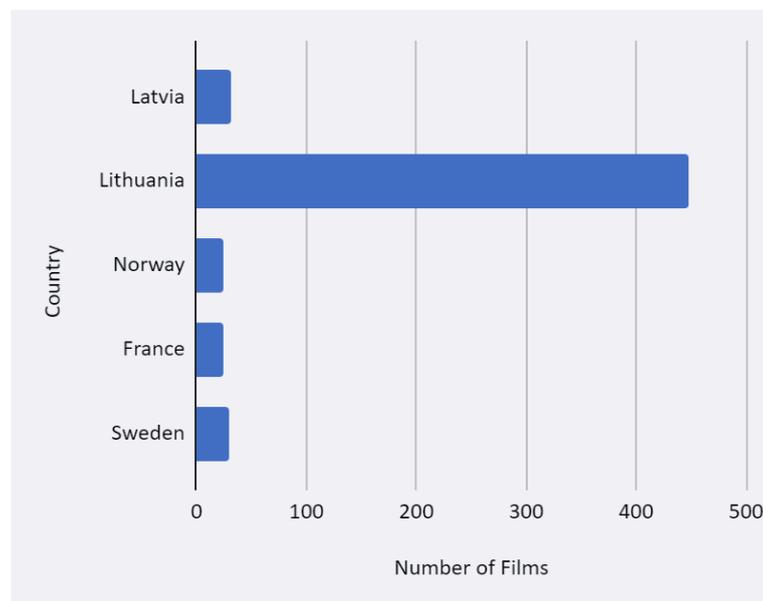
Source: adapted from Lithuanian film centre, n.d.c

To benefit from this tax incentive, a production must meet several specific conditions designed to maximize local impact. These include a minimum spend of 43 000 Eur within the country, a requirement that at least 80% of the total production budget is spent in Lithuania, and a stipulation that at least 51% of the crew are Lithuanian or other EEA citizens (Lithuanian Film Centre, n.d.b). Furthermore, projects must satisfy a cultural content test, ensuring a degree of local cultural relevance (Lithuanian Film Centre, n.d.b). Although, mainly beneficial from tax incentive are Lithuanian films, other countries use this incentive as well. Figure 3 below represents film production countries, in ten years 441 Lithuanian films produced, 31 - Latvian, 30 - Swedish, Norway and France equally of 25 films each (Lithuanian Film Centre, n.d.c).

The success of this framework is not merely theoretical, it is demonstrated by the high profile international productions it has attracted. The acclaimed series "Chernobyl" (2019), for instance, spent over 7 million Eur in Lithuania during its production. More recently, "Stranger Things" Season 4 (2021) brought significant employment opportunities and immense international visibility to the country (Lithuanian Film Centre, n.d.c, Vilnius film office, 2023). These landmark cases effectively illustrate the scheme's power to generate economic and cultural returns, solidifying Lithuania's standing in the global audiovisual landscape.

Figure 3

Top 5 countries with the number of films that used Lithuanian tax incentives (2014-2024).



Source: adapted from Lithuanian film centre, n.d.c

The effectiveness of Lithuania's film tax incentive scheme has been comprehensively evaluated in a policy study commissioned by the Lithuanian Film Centre and conducted by KEA European Affairs, covering the period from 2014 to 2017. The report provides one of the most

detailed national-level assessments of a film tax incentive in a small European economy, combining quantitative I-O based impact analysis with surveys and in-depth stakeholder interviews (KEA, 2018). The findings indicate that the introduction of the incentive had a statistically and economically significant effect on production activity, foreign investment attraction, and employment creation within the audiovisual sector. According to the evaluation, productions benefiting from the scheme generated approximately 43,5 million Eur in expenditure within Lithuania, of which more than 24,4 million Eur constituted foreign investment, demonstrating strong additionality and limited displacement effects (KEA, 2018).

KEA's (2018) "Evaluation of the Fiscal Incentive Scheme for Film Production in Lithuania" shows that employment impacts were also substantial: between 10,583 and 12,170 freelance positions were created over the evaluated period, generating between 6,6 to 8,2 million Eur in net personal income, which in turn induced further consumption effects within the domestic economy. Importantly, the report concludes that the fiscal return to the country. The estimated combined income taxes, social security contributions, and VAT, which was around 10,8 million Eur, was enough to cover the estimated tax spending of 9,5 - 10 million Eur, suggesting fiscal neutrality or mild net positive returns because of existing tax incentive for film production.

Beyond quantitative indicators, KEA (2018) report highlights qualitative structural effects, including increased international visibility, enhanced co-production capacity, and rising domestic market share for national films, which exceeded 20%, becoming one of the highest levels in Europe for a small language market. However, the study also identifies structural vulnerabilities, notably growing labour shortages, limited production infrastructure, and dependence on continued policy competitiveness, concluding that the long-term effectiveness of the scheme depends on complementary investments in skills development, promotion, and data monitoring (KEA, 2018).

Moving from the national to the city level, a 2023 economic impact analysis of the film industry in Vilnius demonstrates the importance of city level assessment for identifying specific local strengths and policy needs. Vilnius film office (2023) study employed a mixed-methods approach, a methodology chosen specifically to triangulate hard data with on-the-ground industry perspectives, a particularly effective strategy for a smaller market where purely quantitative data may be limited. Its data collection involved two main streams: qualitative insights gathered from 15 semi-structured interviews with local industry representatives, and quantitative analysis of official statistics from sources like the Lithuanian Film Centre.

The Vilnius office (2023) study quantified the direct economic benefits generated by film productions in the city of Vilnius. Total spending by productions in Vilnius amounted to 37,8 million Eur and of this total, 32,4 million Eur constituted local costs incurred within Lithuania. The direct return to the Vilnius city budget from Personal Income Tax alone was 2,1 million Eur. The study estimated that the industry created or maintained 1942 jobs in the city. In total the estimated tax benefit to the Lithuanian state budget from this spending was 9,3 million Eur (Vilnius film office, 2023). The outputs included a detailed SWOT analysis and a set of concrete policy suggestions, such as the need to establish a regional film fund for Vilnius and invest in dedicated studio infrastructure to overcome identified weaknesses (Vilnius film office, 2023). Despite existing challenges, Vilnius demonstrates that investing in an environment conducive to filmmakers can significantly benefit the city and the entire region.

Overall, the Lithuanian case supports the argument that well designed tax incentives can be effective in small open economies and to attract foreign projects investment, but also to simultaneously boost domestic production and creative output from local creators. This suggests that the incentives are not merely a mechanism for external attraction but also a powerful tool for internal economic and cultural growth. On the other hand, existing studies on the Lithuanian tax incentive, including various reports, primarily utilize a mix of descriptive statistics and conventional economic impact and cost-benefit analyses. However, these tools do not directly establish a causal link between the introduction of the tax incentive in 2014 and the subsequent growth of the Lithuanian film industry.

2. METHODOLOGY FOR ASSESSING THE IMPACT OF LITHUANIAN TAX INCENTIVE FOR FILM PRODUCTION ON THE INDUSTRY GROWTH

2.1. Research background and justification

This chapter details the research methodology used to assess the Lithuanian tax incentive's growth of the Lithuanian film industry. The research is designed to answer a central question: does Lithuanian fiscal incentive - tax relief for film production investment - help to grow the local film industry and is a significant factor that helps the Lithuanian film industry to become a strong film production hub? Answering this question requires a systematic and careful approach. This chapter outlines the logic behind the study's design, the specific strategies employed for data collection and analysis, and a transparent discussion of the research's limitations. The methodology has been constructed to ensure the validity and reliability of the findings, providing a solid foundation for the strategic recommendations offered in the final chapter.

The logic of this study is guided by a pragmatic research approach, which emphasizes integrating different methods to understand complex, real world issues and generate practical knowledge. The research is structured to test two primary hypotheses:

- H1: The expenditure in the film sector generates a significant Gross Value Added (GVA) multiplier effect within the Lithuanian economy.
- H2: Lithuanian government tax incentive, introduced in 2014, was the factor that helped the film industry to grow.

This study adopts a sequential explanatory mixed-methods design incorporating sectorial multiplier calculation, interrupted time series (ITS), and TWFE differences-in-differences (DiD) methods supported by synthetic control method (SCM) to effectively test the main research question and hypotheses. This research approach of multiple methods was selected because it offers the most comprehensive framework for answering the research question. Specifically, it allows for a progression from observing the film industry's economic position in Lithuania to determining if the country's current film production tax incentive promotes faster industry growth compared to other European countries, and finally, establishing the causal effect of whether the tax incentive was the key factor driving the industry's growth and strengthening.

Ultimately, the final stage of the research will synthesize findings from all previous research phases to address the central research questions. This will allow for the formulation of strategic recommendations for the Lithuanian policy makers.

The primary phase of the research is quantitative, utilizing Input-Output (I-O) modeling to calculate the sectorial multiplier of the film industry. The calculation of sectorial multipliers will answer the question if the film industry in Lithuania holds a significant and growing position within the Lithuanian economy, with significant linkages to other sectors, or its part in the economy is too small to have potential to become a more significant contributor to Lithuania's gross domestic product (GDP).

The decision to use I-O modeling as the first quantitative method in this research is driven by its robustness in illustrating comprehensive economic linkages and clearly quantifying multiplier effects (Miller and Blair, 2009). Other case studies demonstrate this model's application in calculating the film industry's economic impact, thereby providing comparable information and facilitating informed recommendations for policymakers (Oxford Economics, 2012; Olsberg SPI, 2014; Olsberg-SPI and Nordicity, 2017). I-O modeling is suitable for Lithuania due to the availability and quality of national level economic data provided by Statistics Lithuania, enabling precise analysis of inter sectorial economic relationships. Moreover, Lithuania's relatively small and open economy, characterized by significant reliance on external demand and clearly identifiable sectorial linkages, is well-suited to the I-O approach (KEA, 2018). This method effectively captures the extensive interdependencies between film industry expenditures and various domestic sectors, highlighting how an initial spending injection can propagate through and amplify within the economy (Oxford Economics, 2012). The clarity and intuitive nature of I-O modeling also facilitate effective communication of policy implications to stakeholders, making it an ideal choice for policy-oriented research, and many other European film industry studies are using similar models (KEA, 2018; Oxford Economics, 2012; Olsberg SPI, 2014; Olsberg-SPI and Nordicity, 2017).

Sectorial multiplier analysis demonstrates the extensive ripple effects of film production spending throughout the national economy (Miller and Blair, 2009). Sectorial multiplier analysis in KEA (2018) demonstrates that every euro invested in the film sector generates a greater total economic output than the initial investment, benefiting ancillary industries such as:

- accommodation and hospitality: hotels, catering, and local transportation.
- rental services: equipment, vehicles, and studio space.
- construction and real estate: development of sound stages and production facilities.
- creative and professional services: legal, financial, marketing, and post-production.

Therefore, fostering the sustained growth of the film industry is a strategic imperative for long-term national economic development, leveraging its high multiplier effect to create jobs,

attract foreign investment, and diversify the national economic base beyond traditional sectors (Olsberg- SPI, 2019; Olsberg- SPI, 2020).

The research will follow by incorporating regression calculations as the primary statistical tool for causality analysis to answer the main question: does fiscal incentives help local film industries to grow. The first method is an interrupted time series design. This approach is important for rigorously assessing the impact of the introduction of the tax incentive policy in Lithuania in 2014 compared to other countries that have not introduced similar tax incentives. The ITS analysis involves establishing a baseline by analyzing time-series data for film industry growth metrics, specifically gross added value (GVA), over a significant period prior to the implementation of the tax incentive. The precise interruption time point is set at the policy's enactment (year 2014), and the policy effect will be measured. This model estimates the immediate change in the level (intercept shift) and the change in the trend (slope change) of the outcome variables after the tax incentive was introduced, relative to the pre-intervention period (Lopez Bernal, Cummins, & Gasparrini, 2017). The anticipated findings will demonstrate that the tax incentive is working locally by showing a statistically significant, positive shift in industry growth indicators post-intervention. Consequently, this analysis aims to confirm that the incentive is a direct and effective mechanism supporting industry growth within Lithuania.

The study will employ a difference-in-differences (DiD) design as the second method to isolate the causal effect of the film production tax incentive on the development of Lithuania's film sector. While literature and other countries' case studies frequently calculate sectorial multiplier growth following the introduction of such incentives, it less often establishes the incentive as the distinct causal factor (Bradbury, 2019; Thom, 2019). This study aims to bridge that gap by specifically determining the causal link between the policy and industry growth over the years. To determine if the growth in Lithuania's film industry Gross Value Added (GVA) exceeded the expected trajectory without intervention, the DiD model will compare Lithuania's GVA against that of other European Union countries that implemented similar incentives at differing time points.

As a final support and complement to DiD findings, synthetic control method (SCM) will be used to check if selected countries for a data set where the right choice to answer the causality link with the tax incentive. SCM constructs a weighted combination of donor units that best replicates the treated country's pre-treatment trajectory, effectively approximating what would have happened to Lithuania's film-industry GVA in the absence of the tax incentive by creating a "synthetic" Lithuania as a weighted average of several donor countries (Abadie, Diamond, &

Hainmueller, 2010). By comparing the results of both Lithuanias the causality effect will be finally captured.

2.2. Research methods and data for evaluating Lithuanian tax incentive

2.2.1. Data sources and selected time periods for researching film industry growth

The Lithuanian tax incentive for film production was initially introduced in 2014 and subsequently amended in 2019 (Lithuanian film centre, n.d.b). To accurately assess the tax incentive's impact on the film industry, a comprehensive observation period is required, that takes enough years before the fiscal changes to film production taxes and after the incentive's implementation. The data used for calculations takes a period from 2005 to 2024, enabling a precise analysis of 20 years of data.

I-O tables, essential for calculating sectorial multipliers, are available on Lithuania's Official Statistics portal. The relevant sector for the film industry in the I-O tables is "50 Motion picture, video and television programme production services, sound recording and music publishing" with data released only every five years, from 2010 up to the most recent data in 2020 (Statistics Lithuania, n.d.). Data of this specific sector is not available for 2005 as this sector was not specified in the I-O tables, so for the sectorial multiplier calculations only 3 periods will be taken: 2010, 2015 and 2020.

Data from Eurostat (n.d.) is the second source, providing necessary yearly figures from 2005 to 2024, specifically concerning the film industry sector. This database contains national accounts data, including Gross Domestic Product (GDP) and Gross Value Added (GVA), for each country, as well as sector specific information. Specifically, the sector identified by the code "nama_10_a64" (NACE J59–60) which covers "Motion picture, video, television programme production; programming and broadcasting activities" will be used for the ITS and DiD and SCM calculations.

The data from the aforementioned sources regarding sectors may vary slightly. For instance, the Statistics Lithuania includes sound recording and music publishing activities in its relevant sector definition, whereas data sources from OECD (2024) and Eurostat (n.d.) offer more specific data that excludes music activities. By using different data sources and multiple calculations, the film industry's growth and impact to Lithuania's economy and tax incentive trend can be captured precisely enough.

For having indicators for a general country's economical growth and development, each country's GDP per capita yearly data will be taken into calculations from Eurostat database. It is important to take into account general economic development as film industry growth may be impacted by general growth of the country.

2.2.2. European countries selection for regressions calculations and comparison

To correctly calculate Interrupted time series, differences-in-differences and synthetic control models other European countries' film industry statistics are needed to be used. The selection of countries for data and trend comparison should be selected by specific criteria. Countries were selected according to criteria, from the most important to least by exclusion. To have representative data at least 10 countries are selected with 20 years of film GVA data each.

The first criteria - country did not have tax incentive for film production in a period 2013 - 2015. This is needed to capture Lithuanian tax incentive effect introduced in 2014, if other selected countries for the comparison had similar tax incentive, Lithuanian tax incentives effect may not be captured or calculations may be misleading. Although, for models to be more precise, it would be better to compare with other countries that did not have tax incentives in the period 2004 - 2024. The only country that does not have a tax incentive in this period is Denmark (Nordisk Film, 2024). Austria is also good for selection, as government support via tax reduction for film production was introduced in 2023 (Cineuropa, 2022). Almost all other European union country governments use similar actions to support film industries in their countries (The Reboot Project, 2025).

The second criteria for selecting country data - similar economy size, economic development history (post-Soviet countries) and geographical proximity. By given criteria, neighboring Baltic countries are the most similar to Lithuania. Estonia introduced a tax incentive in 2016, so according to the first criteria, it was selected in the data set (Film Estonia, n.d.). Latvia's government introduced a tax incentive in 2010, but tax rebate was increased in 2014 so when making calculations this country's data may distort the results, so Latvia will not be selected into the data set for calculations (National film centre of Latvia, 2013).

Central and Eastern European countries (CEE) countries are bigger than Lithuania, but have a similar economic development history. Poland introduced tax rebate for local film production in 2019, Czechia - 2017, Slovakia - 2014, Slovenia - 2018, Hungary - 2005, Croatia - 2012 (KIPA, 2019; Entertainment Partners, 2025; Czech Film Commission, 2020). Slovakia is not matching the first criteria, so it is crossed out from the data set. The selection process for this

research excluded Bulgaria and Romania because they were generally considered to have weaker economic development during the period of an observation (GeoRank, 2025).

Smaller Nordic countries like Denmark and Finland are also suitable for the research countries because of geographical proximity. Finland introduced a tax incentive for film production in 2017 (Ministry of Economic Affairs and Employment of Finland, 2016). Denmark still does not have any government incentives for the film industry (Nordisk Film, 2024). Although its economic development and history is not similar to Lithuania, when calculating ITS, DiD model and SCM it can be used to compare film industry development to Lithuania.

Austria matches the first criteria, but is not suitable for the second. But as it introduced tax incentives only in 2023, it may be suitable for having a bigger variety in the data set, and more than one country without tax incentive (Cineuropa, 2022). Other western markets are not appropriate for comparison due to their different levels of economic development and a continuous, long standing film production industry history.

Table 1

Countries that were selected for the causality research methods.

Country	Year tax incentive introduced	Selected to interrupted time series method	Selected for TWFE DiD method	Selected for Synthetic control method
Lithuania	2014	Yes	Yes	Yes
Latvia	2010	No	No	No
Estonia	2016	Yes	Yes	Yes
Poland	2019	Yes	Yes	Yes
Czechia	2010	No	Yes	No
Finland	2017	Yes	Yes	Yes
Slovakia	2014	No	No	No
Slovenia	2018	No	Yes	No
Hungary	2005	No	Yes	No
Croatia	2012	No	Yes	No
Denmark	-	Yes	Yes	Yes
Austria	2023	Yes	Yes	No

Source: compiled by the author based on the conducted research (Nordisk Film, 2024; Cineuropa, 2025; The Reboot Project, 2025; National film centre of Latvia, 2013; Entertainment Partners, 2025; Film Estonia, n.d.; KIPA, 2019; Czech Film Commission, 2020)

The Table 1 above represents countries that were considered to be selected for the film industry development comparison in the research and the countries that were selected. Slovakia and Latvia were excluded from the data set. Although Latvia's tax incentive for film production was introduced in 2010, it was adjusted in 2014 and may have had a positive impact on industry growth, so it is not suitable for comparison. Slovakia introduced a similar incentive at the same year as Lithuania - 2014.

2.2.3. Input-Output method for impact for Lithuania's economy analysis

The primary quantitative method for this study is Input-Output (I-O) analysis, a standard macroeconomic tool used to quantify the interdependencies between different sectors of an economy (Leontief, 1986; Miller and Blair, 2009). Specifically, this research will utilize the static Leontief I-O model to calculate the sectorial economic impact generated by an injection of spending from film production.

The fundamental principle of the model is captured in the Leontief equation (Leontief, 1986):

$$X = (I - A)^{-1} Y, \quad (1)$$

where X is the vector of total industry output required to satisfy the final demand; I is the identity matrix; A is the matrix of technical coefficients, where each element a_{ij} represents the input required from industry i to produce one monetary unit of output in industry j . This matrix will be derived from Lithuania's official 2021 I-O tables (Statistics Lithuania, n.d.), applying the standard Industry Technology Assumption to create a symmetric industry-by-industry table. Y is the vector of final demand. For this study, it represents the initial expenditure from film productions, which is treated as an exogenous shock to the economy.

$$\text{Output Multiplier} = \sum_{i=1}^n L_{ij} \quad (2)$$

The core of the multiplier calculation lies in the $(I - A)^{-1}$ term, known as the Leontief Inverse Matrix or the total requirements matrix (Leontief, 1986; Miller and Blair, 2009). Each element in this matrix, L_{ij} , represents the total output required from industry i - both directly and indirectly - to satisfy one monetary unit of final demand for the products of industry j . From this, the Output Multiplier for a specific sector j is calculated by summing the elements in the corresponding column of the Leontief Inverse Matrix (Miller and Blair, 2009). This multiplier reveals the total value of production generated across all sectors of the economy for every one unit increase in final demand for the output of sector j .

2.2.4. Film industry's growth evaluation using Interrupted time series

The single country Interrupted time series regression model for Lithuania to examine whether there is a structural break in the film sector's trajectory around the introduction of the tax incentive in 2014. The ITS specification uses annual data on the logarithm of gross value added in the "Motion picture, video, television programme production; programming and

broadcasting activities" ($\log GVA_t$) and allows both the level and the trend of the series to change after 2014.

The equation to capture country's film industry's trajectory broke on year 2014 (Lopez Bernal, Cummins, & Gasparrini, 2017):

$$\log GVA_t = \alpha + \beta_1 t + \beta_2 \text{Post}2014_t + \beta_3 t \text{Post}2014_t + u_t, \quad (3)$$

where t is a linear time index (2005 = 1, 2006 = 2, ...); α is a baseline level. $\text{Post}2014_t$ is an indicator equal to 1 for years $t \geq 2014$, and 0 otherwise, capturing an immediate level change in 2014; $t \text{Post}2014_t$ is an additional trend term that is 0 before 2014 and increases by 1 each year thereafter, capturing a change in the slope of the series after the intervention; β_1 represents the pre-intervention growth rate (year 2014); β_2 represents the discrete jump (up or down) at 2014; β_3 is for the change of slope (growth rate) after 2014; u_t is capturing everything else that effects film sector ($\log GVA_t$): random shocks in a year, unobserved errors, etc.

This design provides descriptive, visual evidence on whether Lithuania's and other countries with no or late tax incentives, if film GVA accelerates or decelerates after 2014. It does not include a control group and itself cannot distinguish tax incentive effects, or other shocks to the industry itself. This method is used rather to check if there was a shock around 2014 in Lithuania compared to other countries that impacted country industry and how it reacted to that shock.

2.2.5. Capturing causality of Lithuanian of tax incentive impact using TWFE Differences-in-Differences method

The main question that is tried to be answered with causality regressions is: did Lithuania's film tax incentive, introduced in 2014, was the factor that made the film industry grow? In other words: was the tax incentive the causal effect for industry growth? To answer it two way fixed effects TWFE differences-in-differences (TWFE DiD) will be used.

This method idea is to capture how the treated unit - Lithuania film industry GVA - changes before and after the tax incentive (government fiscal policy) (de Chaisemartin and D'Haultfoeuille, 2022). Other countries' film industry GVA will be used as control units, and their industries changes over the same time will be compared. Attributed differences of these differences to the policy will be assumed that without the policy Lithuania would have followed the same trend as the controls (de Chaisemartin and D'Haultfoeuille, 2022).

DiD method can be written as follows:

$$\text{Effect} = (\text{Treated after} - \text{Treated before}) - (\text{Controls after} - \text{Controls before})$$

Two way fixed effects (TWFE) is commonly used in DiD regression for controlling all time invariant differences between all countries and common shocks countries may experience through the years (de Chaisemartin & D'Haultfoeuille, 2022). This part is very important for this research as countries are very different in their own economical situations and may react to various shocks over time differently, in the researched time period 2005-2024 all countries have experienced various unexpected shocks, like COVID-19 pandemic, TWFE DiD is suitable for controlling them. TWFE model estimates the treatment effect by exploiting variation across time and units while controlling for unobserved unit-specific time-invariant heterogeneity (α_i) and common time-specific shocks (γ_t) (de Chaisemartin and D'Haultfoeuille, 2022).

TWFE DiD model equation:

$$\ln GVA_{it} = \alpha_i + \gamma_t + \beta Policy_{it} + \delta \ln GDPpc_{it} + \varepsilon_{it}, \quad (4)$$

where: $\ln GVA_{it}$ is film industry GVA in a country ($\log(GVA_J59_60)$); i stands for country; t stands for year; α_i are country fixed effects that are capturing time invariant differences between countries (size, geography, etc.); γ_t are year fixed effects, capturing common shocks (for example, EU - wide trends, global crisis, etc.); β is the coefficient of interest, because the dependent variable is in logs, β can be converted into an approximate percentage effect caused by the policy using $100(\exp(\beta) - 1)$; $Policy_{it}$ is either $Policy_LT_{it}$ for Lithuanian model or $Policy_EE_{it}$ for Estonian model; $\ln GDPpc_{it}$ controls for general macroeconomic development GDP per capita ($\log(GDP\ per\ capita)$); ε_{it} is an idiosyncratic error term.

To make the monetary variables comparable over time and across countries, all nominal values are transformed into natural logarithms:

- $\ln GVA_{it} = \log(GVA_J59_60)$
- $\ln GDPpc_{it} = \log(GDP\ per\ capita)$

The model is estimated using the within estimator in the R package *pml*, with both country and time fixed effects (*effect="twoways"*). To allow for arbitrary heteroskedasticity and serial correlation within countries, cluster-robust standard errors at the country level will be used (*vxovHC(..., cluster="group"*)).

The panel is organised at the country year level. Lithuania is the country of interest. Estonia, Finland, Poland, Czechia, Slovenia, Hungary, Croatia, Denmark and Austria are used as potential comparison units, depending on the specification.

Treatment variable is Lithuania, it introduced a film tax incentive in 2014, so: $LT_i=1$ if country i is Lithuania, 0 otherwise; $Post2014_t=1$ if $t \geq 2014$, 0 otherwise; $Policy_LT_{it} = LT_i \times Post2014_t$ is treatment indicator.

Thus, $Policy_LT_{it} = 1$ only for Lithuania in the post 2014 years, for all other countries year pairs it equals zero.

To examine dynamics and test the parallel trends assumption, an event study model will be estimated. For Lithuania, defined set of dummy variables for each year relative to the last pre-treatment year 2013:

- $LT_rel_m_k$ for k years before 2013 (for example, -1, -2, ...);
- $LT_rel_p_k$ for k years after 2013 (for example, +1, +2, ...);

The year 2013 dummy is omitted and acts as the baseline. The specification is:

$$\ln GVA_{it} = \alpha_i + \gamma_t + \sum_{k \neq 0} \theta_k LT_rel_{it}^k + \delta \ln GDPpc_{it} + \varepsilon_{it}, \quad (5)$$

where each coefficient θ_k measures Lithuania's deviation from the control countries in year k relative to 2013. Plotting the θ_k gives an event study graph. Flat coefficients before the policy and rising coefficients after the policy support the DiD identification strategy.

Because many European countries introduced film incentives at different times, there is a concern that some control countries may be partially treated. As a strict robustness check, the model will be also re-estimated with treated Lithuania and only Denmark and Austria as untreated controls. The specification is identical to the baseline, but the sample is restricted to Lithuania, Denmark and Austria. This check helps to understand whether results depend heavily on which comparison countries are chosen.

2.2.6. Synthetic control method as support TWFE DiD model

To complement and check TWFE DiD model, Synthetic control method will be used where “synthetic Lithuania” is created out of donor countries to see what would have happened to the film industry GVA growth if Lithuania would have never introduced tax incentive for film production. Two parallel trends of “synthetic” and real Lithuania film industry GVA trend will be compared for final proof of fiscal policy effectiveness (Rickman and Wang, 2023).

Lithuanian Synthetic control method setup:

- Treated unit: Lithuania
- Policy year: 2014
- Pre-treatment years: 2010-2013
- Post-treatment years: 2014-2019
- Donor pool: Estonia, Finland, Poland, Denmark
- Outcome: $\ln GVA_{it}$

Selected countries for donor pool: Estonia, Finland, Poland and Denmark are similar enough to Lithuania to be plausible controls but did not have the same policy at the same time.

Predictors used for matching: average logGDP per capita in the pre-period, and logGVA in 2010, 2012, and 2013. The goal is for the synthetic unit to match Lithuania not only in terms of past GVA but also in terms of underlying economic conditions.

The core SCM equation is (Abadie, Diamond, & Hainmueller, 2010):

$$\ln GVA_t^{syn} = \sum_j w_j \ln GVA_{jt}, \quad (6)$$

where: t time period (2010, 2011, etc); j index for donor countries in the synthetic control pool; $\ln GVA_t^{syn}$ is the outcome for synthetic Lithuania in year t ; $\ln GVA_{jt}$ is the log film GVA of donor country j in year t ; $\sum_j w_j$ is the sum of weight assigned to donor country j by the SCM algorithm. It is not negative.

The SCM gap in each year captured using equation:

$$Gap_t = \ln GVA_t^{LT} - \ln GVA_t^{syn}, \quad (7)$$

The average treatment effect over 2014 - 2019 is the mean of Gap_t in the post treatment years, converted into a percentage $100(\exp(Gap) - 1)$. Where a positive gap means Lithuania outperforms its synthetic twin.

Visualised graphs will be used to see changes over time: a path plot of Lithuania vs synthetic Lithuania over time, and a gap plot showing Gap_t .

2.3. Research Limitations

It is important to transparently acknowledge the potential limitations inherent in this study's methodology for accurately interpreting the findings and understanding the scope of the conclusions drawn. The methodological boundaries include factors such as sample size, the specificity of the chosen research design, potential biases in data collection.

First, the chosen Input-Output model is, by its nature, static. It provides a snapshot of the economy but does not capture dynamic effects such as price changes, technological

advancements, or potential displacement of other economic activities, which may alter sectorial relationships over time (Miller and Blair, 2009; McLaughlin, 1993).

Second, a limitation of the TWFE differences-in-differences designs is that they rely on the parallel trends assumption. Although the countries in the sample differ in history, size, and economic development, they operate in a common EU market and have all introduced local film tax incentives, so their outcome trends may evolve differently over time. In this context, the parallel trends assumption may be violated, meaning that the core identifying condition, that in the absence of the intervention, treated Lithuania and the control countries would have experienced the same average trend in outcomes might fail (Goodman-Bacon, 2021; Roth et al., 2023).

Despite the possibility of parallel trends violation, another opposite limiting effect may occur. The European film markets can be characterized by vast disparities in historical development, market size, and general economic maturity. Mature markets such as Denmark or Austria used in the data set, operate with entrenched infrastructure and consistent production volumes, whereas smaller markets like Lithuania or Estonia are emerging from a post-Soviet context with different growth dynamics. These structural divergences suggest growth rates of these countries likely differ, so heterogeneity of market baselines can be violating the core requirement that treated and control trends do not depart in the pre-intervention period (Goodman-Bacon, 2021; Roth et al., 2023).

Furthermore, the other limitations may occur - staggered adoption and idiosyncratic shocks effects. European nations introduced tax incentives at different points in time, meaning there is no single pre-treatment period common to all control countries. The noise in data can appear and can skew annual trends significantly and not reflect a stable trend. Also, the true causal impact of the policy may be not found, because of confounding historical and economic variances, potentially leading to biased estimates of policy effectiveness (Goodman-Bacon, 2021; Roth et al., 2023).

To mitigate these TWFE differences-in-differences biases, synthetic control methods are used in the research. Although this method also has its limitations, its application is constrained by significant computational and algorithmic limitations. Recent methodological critiques, like Kuosmanen et al. (2021), highlight that the standard “Synth” algorithm in program RStudio is prone to numerical instability, where the optimization process often fails to converge to a global optimum. The research indicates that the resulting weights assigned to donor countries can be

dramatically altered by merely reordering the donor pool or predictors, casting doubt on the robustness of the constructed counterfactual (Kuosmanen et al., 2021).

Furthermore, the method relies on a joint optimization of donor and predictor weights, which presents an NP-hard bilevel problem. This design flaw frequently leads the algorithm to favor "corner solutions" that rely heavily on a single predictor, effectively negating the benefits of a multi-predictor approach and potentially oversimplifying the complex economic factors driving film industry growth (Gilchrist and Sands, 2023). For example, even neighbouring Baltic countries survived COVID-19 pandemic differently, Lithuania experienced a stagnation or very slight decline, while Estonia experienced a much sharper contraction (Swedbank, 2021).

These limitations will be explicitly acknowledged and carefully considered when interpreting the study's results and formulating fiscal policy evaluation conclusions and recommendations.

3. EVALUATING THE IMPACT OF LITHUANIAN TAX INCENTIVE FOR FILM PRODUCTION ON THE FILM INDUSTRY GROWTH

3.1. The evaluation of Lithuanian film industry impact for Lithuanian economy using multiplier effect calculation

To understand where the film industry stands in Lithuania's economy, a sectorial multiplier was calculated using Statistics of Lithuania Input-Output tables, using 2010, 2015 and 2020 year data. The film industry multiplier, shown in Table 2, was greater than 2 for all three years with the growing tendency. The data shows that the sectorial multiplier grew by 4,99% comparing 2020 to 2015, by 2,58% comparing 2015 to 2010, and in ten years the multiplier grew 7,69%. This constant growth indicates that the Lithuanian film industry is continuously developing and contribution to the national economy is increasing.

Table 2

Lithuanian film industry related sector “50 Motion picture, video and television programme production services, sound recording and music publishing” multiplier effect.

Sector multiplier			
2005	2010	2015	2020
No sector data	2.12	2.17	2.28

Source: compiled by the author based on the conducted research

A multiplier exceeding 2 is economically strong and suggests that the film sector acts as a key sector with strong backward linkages for the Lithuanian economy, it is not merely a cultural expense but a high leverage economic driver. Sectorial multiplier calculations is evidence that film industry has a significant part in LT economy - every 1 Eur spent in the film production sector generates approximately 1,28 Eur in total expenditure within Lithuania in 2020, 1,17 Eur - 2015 and 1,12 Eur - 2010. A rising multiplier over the years suggests that the Lithuanian film industry is increasingly sourcing inputs from domestic providers rather than relying on imports (leakage) (Oxford Economics, 2012). This aligns with the theoretical framework of an industrial cluster, that when the particular sector matures, in this case film sector, it stimulates the growth of supporting industries and sectors, such as construction (set building), hospitality (catering and accommodation), logistics, and legal services (Medel and Gossel, 2015; Łazarczyk, 2021).

When evaluating the strategic weight of the film industry, it is necessary to benchmark its sectorial multiplier against other dominant sectors which have multipliers over 2 in the Lithuanian economy. In 2020 among 34 sectors that have a greater multiplier than 2, the film industry sector takes 11th place, full list of multiplier coefficients are presented in the Annex 1. Typically, service oriented sectors exhibit lower multipliers due to their reliance on high value human capital rather than physical intermediate consumption (Andreoni, 2013). However, the data reveals that the film industry is different from this categorization, and is performing closer to industrial manufacturing sectors than to digital or creative services (Table 3).

The film sector operates as a sectorial aggregator, because film production cannot function in isolation, it requires the constant mobilization of sectors like logistics (transport), hospitality (catering/hotels), and services (costume design) (De Vinck, Lindmark, 2012). Multiplier table 10 in the Annex 2 shows 43 sectors that are impacted by film industry expenditure and the Table 3 below shows the sectors that are impacted the most.

Table 3

Sectors that are impacted by Lithuanian film industry related sector (coefficients higher than 0.05)

Sector	Top impacted sectors (coefficients > 0.05)
50 Motion picture, video and television programme production services, sound recording and music publishing	1.15
L Real estate services excluding imputed rents	0.15
77 Rental and leasing services	0.09
19 Coke and refined petroleum products + 20 Chemicals and chemical products + 21 Basic pharmaceutical products and pharmaceutical preparations	0.08
46 Wholesale trade services, except of motor vehicles and motorcycles	0.06
73 Advertising and market research services	0.05
74 Other professional, scientific and technical services	0.05
81 Services to buildings and landscape	0.05

Source: compiled by the author based on the conducted research

Real estate services excluding imputed rents are the most impacted by the film industry. The high coefficient of 0.15 indicates that film production is a land and facility intensive activity. The film industry creates high demand for studio spaces, filming locations rentals, production offices, and warehousing for sets and stimulates it with constant activity of demand.

Rental and leasing activities with the coefficient of 0.09 represents equipment utilization. This means that film productions rarely own their capital assets, they lease heavy equipment,

like cameras, lighting rigs, and transport vehicles. This boosts the specialized equipment rental market. This reflects the cluster nature of the film industry: a film hub does not just host production companies, it sustains a broader ecosystem of capital intensive suppliers such as equipment rental houses and studio facilities.

Chemicals and refined petroleum sector (19 Coke and refined petroleum products + 20 Chemicals and chemical products + 21 Basic pharmaceutical products and pharmaceutical preparations) has the coefficient of 0.08 and shows that various chemical materials are used in set construction, makeup, and special effects. Significant impact on this sector challenges the notion that film is purely a creative or digital sector. It behaves like a physical industry that consumes fuel, occupies land, and requires physical materials, creating tangible economic footprints in non-creative sectors.

The wholesale trade services sector, excluding motor vehicles and motorcycles, is vital for supply chain logistics, evidenced by its coefficient of 0.06. This sector handles the general procurement of essential production materials, including props, costumes, lumber, and catering supplies.

Advertising and market research, other professional, scientific and technical services and services to buildings and landscape each have coefficients equal to 0.05. It represents the industry's need for promotion and a highly skilled freelance workforce like design, photography, translation, and consulting services, services with lower skilled workforce like cleaning, security, and maintenance of filming locations and sets.

The analysis of the Leontief Inverse coefficients from year 2020, 2015 and 2010 provides empirical validation for the thesis hypothesis that expenditure in the film sector generates a significant Gross Value Added (GVA) multiplier effect within the Lithuanian economy. With the sectorial multiplier over 2, the film industry functions not merely as a creative service, but creates linkages with other sectors physical infrastructure, capital, rental and other services. The current lack of substantial support for logistics, hospitality, and tourism contradicts theoretical expectations and the patterns seen in mature markets. This insight may suggest the Lithuanian film industry has yet to fully realize its economic potential and establish the significant role of film industries in more developed economies, which typically exhibit robust connections to the logistics, tourism and hospitality sectors.

3.3. Interrupted Time Series analysis to evaluate Lithuanian fiscal policy impact on film sector growth since 2014

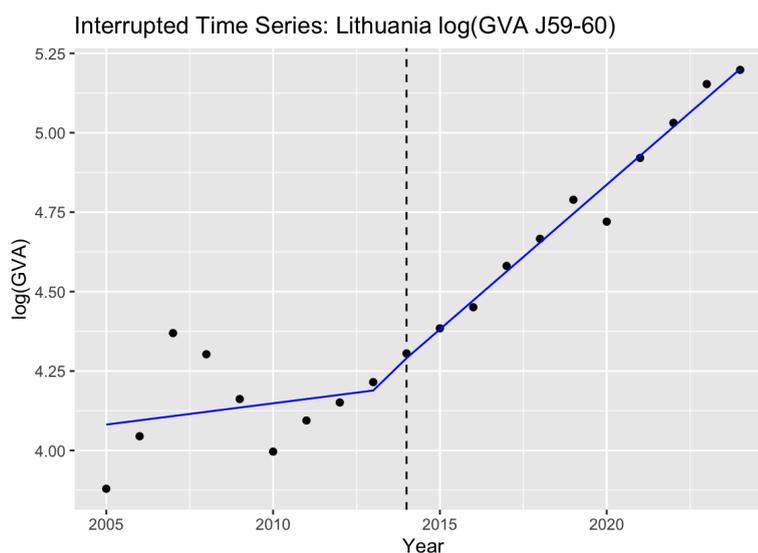
While observing the statistical data it is visible that Lithuanian film industry gross added value is constantly growing, as well as production companies spending with that used tax incentive. However this does not answer the causality question - if government incentive is helping to attract more film production in Lithuania.

To understand the causality tax incentive effect needs to be measured via more complex methods starting with interrupted time series method. The aim is to find out whether there is a structural break in the film sector's trajectory around the introduction of the tax incentive in 2014. If the level jump will be seen, it may mean an immediate effect of the tax incentive, and if the growing trend after 2014 is constant, this could mean that the film industry after tax incentive is helping to grow faster.

Within Lithuania's own time series there is no sharp break in 2014, but the growth trend of the film sector accelerated strongly in the following years: from roughly 1-2% per year to around 9% per year. The model reveals a clear structural break in the growth rate of film sector GVA, while before 2014 growth was roughly flat, the period after 2014 can be characterized by an average annual increase of around 9%.

Figure 4

Interrupted time series: Lithuania log(GVA J59-60)



Source: compiled by the author based on the conducted research

Before the tax incentive changes for film production in 2014, the Lithuanian film industry's GVA was stagnant, the coefficient for the pre intervention trend (t) is statistically

insignificant ($\beta = 0.013, p > .05$). This confirms the descriptive analysis suggesting that the industry struggled to grow and needed government intervention for industry support.

The results provide statistical evidence that the 2014 intervention, assuming that this is likely to be the effect of the introduction or enhancement of the Lithuanian film tax incentive, significantly altered the growth trajectory of the film and audiovisual sector's Gross Value Added (GVA). Although introduction of this tax policy did not cause an immediate GVA level change in 2014, it successfully accelerated the rate of growth. No sudden growth seen in 2014 is expected because production of films typically takes time (Łazarczyk, 2021). Policy attracts projects that are planned in 2014, filmed in 2015 or 2016, and post produced thereafter. Because film production is a rather slow process, sudden change in GVA in 2014 may be seen as an anomaly and real growth should be seen in later years - 2015 or 2016.

Table 4

Regression analysis of the impact of 2014 policy intervention on film industry GVA (Log-Transformed)

Predictor	Model 1 (OLS)	Model 2 (Robust SE)
(Intercept)	4.068***	4.068***
	-0.08	-0.134
Pre-Intervention Trend (t)	0.013	0.013
	-0.014	-0.018
Immediate Policy Effect (Post2014)	0.011	0.011
	-0.098	-0.053
Post-Intervention Growth (t_after)	0.078*	0.078*
	-0.018	-0.018
Model Fit Statistics		
Observations	20	20
R2	0.935	0.935
Adjusted R2	0.923	0.923
Residual Std. Error	0.110 (df = 16)	-
F Statistic	76.58*** (df = 3; 16)	-

Note: Dependent variable is log(GVA) for NACE J59-60. Model 1 reports standard Ordinary Least Squares (OLS) errors. Model 2 reports Heteroskedasticity-Consistent (HC) robust standard errors to correct for potential variance instability. Values in parentheses represent standard errors. $p < .05$. * $p < .01$. ** $p < .001$.

The most significant finding is the positive coefficient for the post intervention slope ($t_{Post2014}$), which is highly significant ($\beta = 0.078, p < .001$). This indicates a structural break in the industry's trajectory. The following year after 2014 when tax incentive was established, the annual growth rate of the sector increased by approximately 7,8 percentage points relative to the

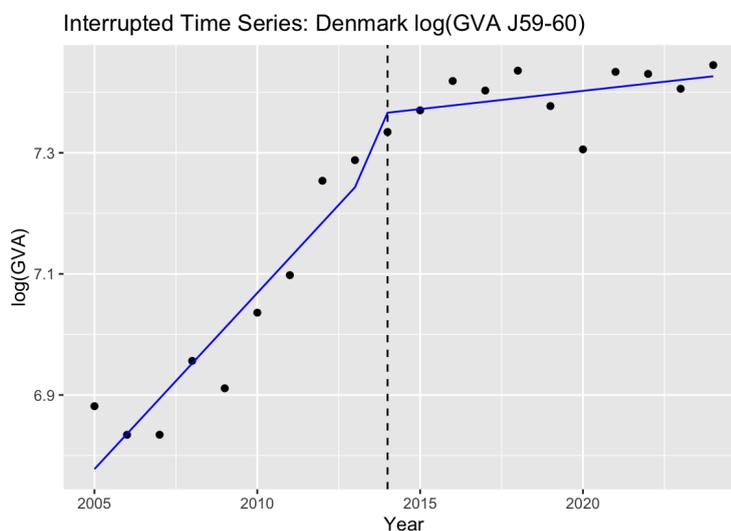
pre 2014 trend. These results support the hypothesis that tax incentive was effective and supported film sector growth.

To clearly state that in sudden growth in Lithuanian film industry's GVA from 2014 is caused by tax incentive, same interrupted time series method was applied for other four countries: Denmark that in all observed time period did not had any similar government incentive for film industry, and Austria where similar tax incentive was introduced only in 2023, and neighbour countries Estonia that introduced similar tax incentive in 2016 and Finland with tax incentive introduced in 2019. All these countries will be compared for the break in 2014 to see if there other structural changes may happen in 2014 that caused Lithuania's film industry change in GVA.

Denmark's film GVA grows strongly around 6% per year before 2014, and jumps up around 2014 by about 12%, and then growth almost stops, the trend flattens to essentially zero afterwards (by average 0,6%), see in the Figure 6. While Lithuania's growth rate increased by 7.8 percentage points after 2014, Denmark's growth rate decreased by 5.2 percentage points, and negative change in slope is seen.

Figure 6

Interrupted time series: Denmark log(GVA J59-60)

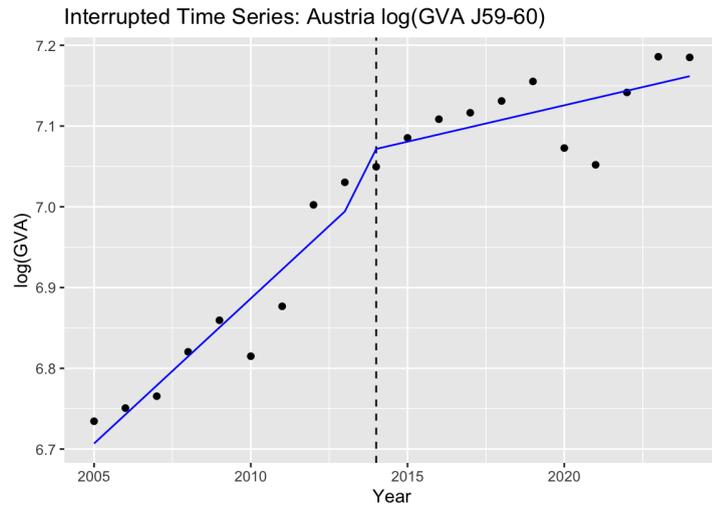


Source: compiled by the author based on the conducted research

When running an interrupted time series on Austria's data shows similar results are seen as for Denmark (Figure 6 below). Before 2014 Austria film industry showed stable growth by average 3,6% per year. In 2014 significant growth by 7% is seen, but after 2014 growth slows down to 0,9% per year on average.

Figure 6

Interrupted time series: Austria log(GVA J59-60)

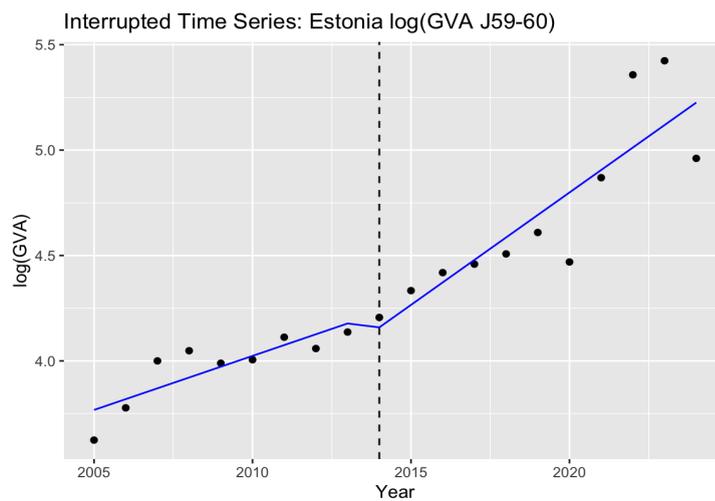


Source: compiled by the author based on the conducted research

Interrupted time series on Estonia's data can be seen in Figure 7 and showed an acceleration trend similar to Lithuania. Before 2014 Estonia film industry showed stable growth by average 5,1% per year. In 2014 a decrease by 12,5% is seen, but after 2014 growth accelerates significantly to 10,6% per year on average. The growth is mainly in years after COVID, where additional support from the government to the film industry was introduced (Estonian Ministry of Culture, 2020; Film Estonia, n.d.).

Figure 7

Interrupted time series: Estonia log(GVA J59-60)

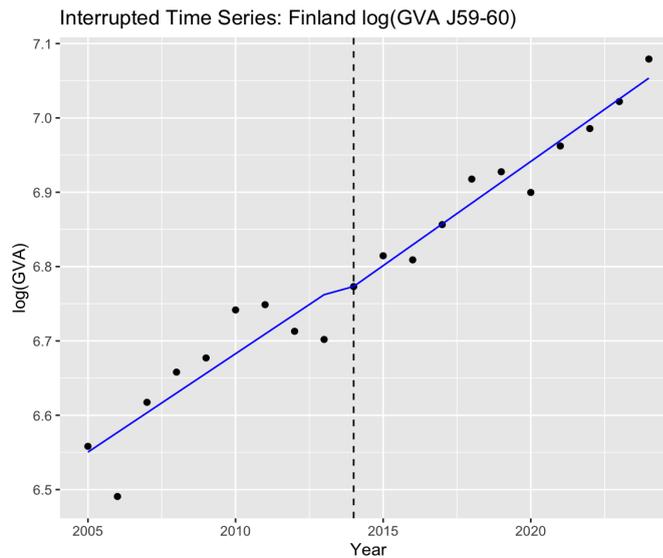


Source: compiled by the author based on the conducted research

As it is seen in Figure 8, interrupted time series on Finland's data shows no significant structural change. Before 2014, the Finland film industry showed stable growth by an average of 2.6% per year. In 2014, no significant level change occurred ($p > 0.05$), and after 2014, growth continued at the same statistical pace (approximately 2.6–2.8% per year), confirming that the 2014 intervention year had no impact on the Finnish market.

Figure 8

Interrupted time series: Finland log(GVA J59-60)



Source: compiled by the author based on the conducted research

On the other hand, out of visual interpretation of given graphs and overview from the structured in Table 5 it can be stated, that around 2014 all observed countries faced a change in the film industry growth. That may indicate bigger structural changes in the European Union, and Lithuania was affected as well, so not the tax incentive itself may be a growth accelerator for Lithuania, but different factors. While Lithuania, Estonia and Finland kept growing around 2014 and later years, Denmark and Austria stopped and their industries became rather stagnant.

The interrupted time series model shows each country's situation around the year 2014. Lithuania seems to be growing, however, the direct causal link between this growth and the tax incentive requires further investigation using other models like differences-in-differences and synthetic control methods. Since once international trends are taken into account, the evidence for a causal effect is weak. This design does not use a control group and therefore cannot distinguish the effect of the tax incentive from other changes affecting the Lithuanian film industry.

Table 5*Interrupted time series results overview for all observed countries*

Cluster	Country	Tax incentive introduced	Status in 2014	2014 structural change	Post-2014 trajectory
Emerging Accelerators	Lithuania	2014	Stagnant	Major Acceleration ($\beta=+0.078$)	High growth boom
	Estonia	2016	Growing	Acceleration ($\beta=+0.055$)	High growth boom
Mature Stabilizers	Denmark	-	Booming	Deceleration ($\beta=-0.052$)	Plateau / saturation
	Austria	2023	Steady growth	Deceleration ($\beta=-0.027$)	Low growth / flat
Control Group	Finland	2017	Steady growth	No change (insignificant)	Steady continuity

Source: compiled by the author based on the conducted research

3.4. Measuring Lithuanian policy effectiveness with TWFE Differences-in-Differences method

Interrupted time series model results suggest that Lithuanian tax incentive was effective, but also something has changed around the year 2014 that resulted in film industry growth for Lithuania, but reduced growth for Denmark and Austria. The main question still remains whether in Lithuania tax incentives for film production help it grow locally? To answer this question another question can be asked: what would the Lithuanian film industry's GVA trajectory have looked like if the tax incentives had never been implemented?

During the period of twenty years countries have also experienced a major shock for the economy that was not related directly to the country's economic strength and may have not been prepared for - COVID pandemic. The model assumes that shocks like COVID-19 or the 2008 financial crisis affected Lithuania and the control countries similarly, but from ITS it is visible that Lithuanian film sector had no bigger decline compared to observed countries and other countries experienced bigger declines (Swedbank, 2021). Because of this reason, the first TWFE DiD method will be applied for years 2005 - 2019 (before the COVID pandemic), and additionally for years 2020 - 2021 when the COVID pandemic was happening and may have influenced the film sector. The results are presented in Table 6 below. The full data set can be seen in the Annex 3.

On average, the introduction of the tax incentive caused the Lithuanian film sector's GVA to be approximately 14,7% higher each year than it would have been without the policy, holding

everything else constant. Lithuania's GDP per capita was also included as a control variable to check Lithuania economic growth could cause film industry growth. The control variable (\ln_GDPpc) is insignificant ($p = 0.755$) meaning this sector grew independently of general economic growth.

Table 6

TWFE DiD estimates of the impact of tax incentives on film industry GVA

Variable	Model 1 (Main DiD)	Model 2 (COVID robustness)
Policy Impact (δ)	0.137**	0.133**
	-0.047	-0.049
COVID-19 interaction	-	0.379*
		-0.059
Control: GDP per capita	0.075	0.093
	-0.24	-0.236
Fixed Effects		
Country FE	Yes	Yes
Year FE	Yes	Yes
Model Statistics		
R2 (within)	0.45	0.52
Observations	100	100

Note: The dependent variable is $\log(GVA)$. Standard errors clustered by country are reported in parentheses. Model 1 estimates the average treatment effect of the 2014 tax incentive. Model 2 includes an interaction term for the COVID-19 pandemic years (2020-2021) to test for resilience. * $p < .01$. ** $p < .001$.

Results are also robust when including years 2020 and 2021 and allowing a Lithuania specific COVID shift: the policy effect remains about +14.3% ($\beta = 0.133$, $SE = 0.049$, $p = 0.0078$), Lithuania outperforms the region during COVID ($LT_covidLT = 0.379 \approx +46\%$, $p < 0.001$). The interaction $LT_CovidLT$ leaves the estimated policy effect essentially unchanged, suggesting that the result is robust to pandemic related disruptions.

The event study coefficients in Table 7 reveal a clear snowball effect of implemented tax incentive. The coefficients for 2 - 3 years before the policy (t-1, t-2, t-3) are negative, suggesting that Lithuania's film sector was actually underperforming relative to regional competitors before 2014. The decline was effectively reversed by the policy. The positive impact of the policy grew consistently over time, from a modest 4,9% increase in the first year (t+1) to a vivid 47,8% increase by the sixth year (t+6). This growing trend supports the multiplier effect hypothesis, suggesting that the initial fiscal stability attracted foreign direct investment, which subsequently developed local infrastructure and workforce capacity, leading to sector growth.

Table 7*Dynamic event study coefficients: the evolution of Lithuanian policy impact over time*

Time Relative to Intervention	Coefficient (β)	Standard Error	Growth Impact (%)	Trend interpretation
Pre-Intervention				
t-3 (2011)	-0.129*	0.037	-12.10%	significant lag
t-2 (2012)	-0.078*	0.032	-7.50%	significant lag
t-1 (2013)	-0.062	0.038	-6.00%	baseline reference
Post-Intervention				
t+1 (2015)	0.048*	0.012	+4.9%	initial traction
t+2 (2016)	0.072*	0.027	+7.5%	steady growth
t+3 (2017)	0.148*	0.01	+15.9%	acceleration
t+4 (2018)	0.252*	0.039	+28.7%	major expansion
t+5 (2019)	0.280*	0.06	+32.3%	peak pre-COVID
t+6 (2020)	0.391*	0.081	+47.8%	COVID resistance

Note: TWFE DiD is a standard design for policy evaluation with panel data, but it relies on the strong parallel-trends assumption across treated and control countries. Given that only one country (Lithuania) is treated and that film sectors may follow heterogeneous trends. To complement TWFE DiD model the Synthetic Control model will be used, which constructs a data-driven counterfactual trajectory that closely matches Lithuania's pre-reform path.

The model uses a control group of European countries that did not implement similar reforms around the period 2013-2015. The TWFE estimator assumes that, in the absence of treatment, the difference between Lithuania and the control group would have remained constant over time. By subtracting this counterfactual trend from the actual observed GVA in Lithuania, the specific economic impact of the policy can be isolated. On the other hand, many countries adopted similar tax policy after 2015 and counterfactual trends may be not accurate to estimate Lithuanians film industry projection. Also, this model compares Lithuania to the average of all countries, including stagnant Denmark, Austria. By including these stagnant film industries, Lithuania looks very good in comparison and growth is projected rapid. For this reason additional Synthetic control method should be applied to approve TWFE DiD results, that Lithuanian tax incentive gave a positive effect on film industry growth.

3.5. Synthetic control method to evaluate scenario of Lithuanian film industry without tax incentive

To address potential bias in the TWFE DiD estimator arising from the selection of unrepresentative control units, a Synthetic Control Method (SCM) was employed. This method

constructs a data-driven "synthetic Lithuania" - a weighted combination of donor countries that best reproduces Lithuania's GVA trajectory prior to the 2014 intervention.

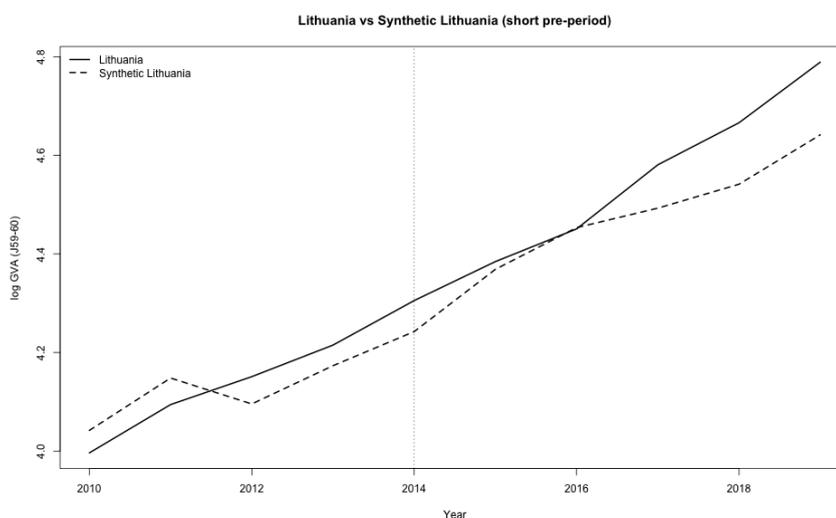
The algorithm determined that Estonia alone is effectively the perfect predictor for Lithuania. The optimal donor weights are:

- Estonia: 0.988
- Denmark: 0.005
- Finland: 0.004
- Poland: 0.003

As shown in the weights distribution, "synthetic Lithuania" is almost exclusively created out of Estonia. This empirical finding corroborates the regional economic alignment between the two Baltic states, confirming that Estonia serves as the single most accurate counterfactual for Lithuania's film sector development in the absence of the 2014 policy shock. The full data set can be seen in the Annex 4.

Figure 9

Lithuania vs Synthetic Lithuania (log(GVA J59-60))



Source: compiled by the author based on the conducted research

Over 2010-2013, as is seen in Figure 9 "synthetic Lithuania" tracks actual Lithuanian logGVA reasonably closely, the pre-treatment gap stays within about $\pm 5 - 6\%$. Averaging over 2014 - 2019 gives: mean log-gap: 0.073; average effect in percent: $100(\exp(0,073) - 1) \approx 7,5\%$.

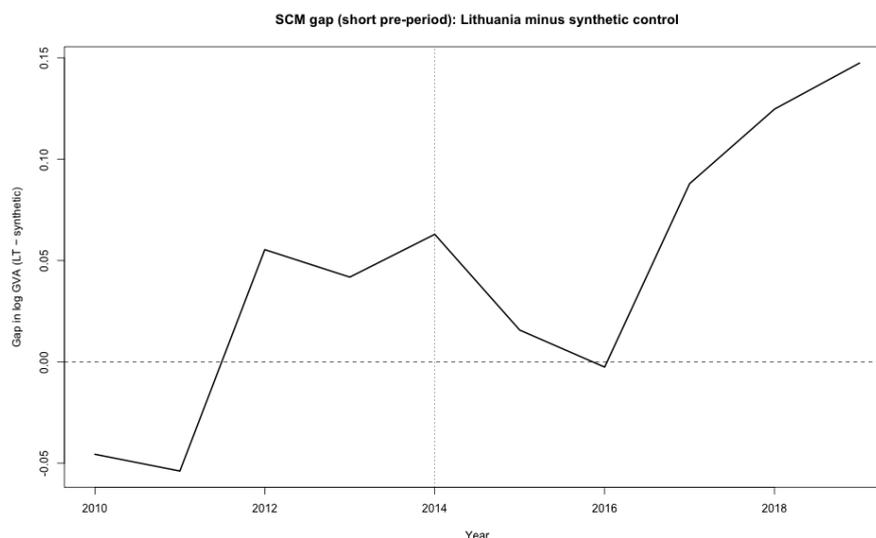
The analysis reveals a positive divergence between the actual Lithuania and its "synthetic Lithuania" following the 2014 intervention of tax incentive. The average log-gap in GVA for the

post-intervention period (2014-2019) is 0.073. This translates to an average annual performance premium of approximately 7,5%.

To clearly visualise the effect of tax policy absence, the gap among Lithuania and “synthetic Lithuania” was calculated. The gap plot (Figure 10 below) shows small differences immediately after 2014, followed by a steadily rising gap from 2016 onwards, reaching around 15 - 16% by 2019. Relative to a synthetic control that closely follows Estonia’s path before 2014, Lithuania’s film sector GVA is around 7,5% higher on average after the introduction of the tax incentive, and is increasing over time. The smaller margin observed compared to the TWFE DiD model suggests that relying solely on production price competitiveness is inadequate. Lithuania's film industry performance is being closely tracked by neighbouring countries with similar profiles. The "synthetic Lithuania" is primarily composed of its closest neighbor, Estonia, which implemented a similar film production tax incentive in 2016. For this reason SCM applied only for a short period of time 2010-2019. Given Estonia's rapid growth, this methodology results in a smaller, yet still economically significant, performance difference.

Figure 10

Lithuania vs Synthetic Lithuania gap in log(GVA J59-60)



Source: compiled by the author based on the conducted research

While the TWFE DiD model estimated a 14,7% impact against a broad European average, the SCM provides a more conservative and robust estimate by comparing Lithuania specifically against its closest peer, Estonia. TWFE DiD model took into account stagnant countries Denmark and Austria, as it was noted in the Interrupted time series model results, this resulted that Lithuania outperforms these countries and the growth was higher. The SCM results

confirm that even relative to a similarly growing neighbor, the specific design and timing of Lithuania's tax incentive generated a distinct, additive economic value of 7,5% per year.

Table 8

Summary of research findings: impact of Lithuanian 2014 tax incentive for film production

Method	Key Finding	Statistical Significance	Findings	Limitations
Sectorial multiplier	Growing multiplier over 2		Film sector is a significant contributor to other sectors in Lithuania economy	Does not prove direct causality
Interrupted Time Series (ITS)	Slope change ($\beta=+0.078$)	$p<.001$	The policy transformed a stagnant sector into a high-growth one.	Does not prove direct causality
TWFE Differences-in-Differences (DiD)	Average Treatment Effect ($\delta=14,7\%$)	$p<.01$	The policy caused a ~15% lift compared to the general European trend.	Compares Lithuania to the average of all neighbors (including stagnant Denmark, Austria). Since they performed poorly, Lithuania looks very good in comparison.
Synthetic Control (SCM)	Performance Gap (+7,5%)	N/A (Optimization)	Lithuania outperformed its closest competitor (Estonia) by 7.5%.	Compares Lithuania to only the best match Estonia. Since it also grew (just not as fast), the gap is smaller.

Source: compiled by the author based on the conducted research

The synthesis of the findings summarized in Table 8 above. Sectorial multipliers and interrupted time series calculations confirm strong growth of Lithuania film industry but do not, on their own, establish causality. TWFE DiD and synthetic control methods, which use different control groups and identification strategies, both confirm a positive effect of the tax incentive, with magnitude depending on how strict the comparison is. Overall, the evidence supports the conclusion that the Lithuanian film tax incentive for film production has been effective in boosting the size and economic significance of the film sector. Still results have to be kept mindful, they are sensitive to the choice of control group and cannot capture all other concurrent policy, economy and market changes.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions:

1. The film sector is consistently highlighted in literature as a critical component of a nation's Cultural and Creative Industries (CCIs). Beyond its artistic or entertainment value, it serves as a powerful economic engine. Its contribution to the national economy is substantial, generating significant added value through direct production spending, job creation, tourism promotion, and the demand for necessary ancillary services.
2. The film industry's value chain, as examined in academic literature, reveals that while every phase is crucial, the physical production stage is the key driver of economic growth and cross sector stimulation. This phase is deeply interconnected with the wider economy, from large expenditures on services such as hospitality, accommodation, construction, and logistics.
3. The global video production consumption environment is dynamic, innovations such a rise of streaming services, especially Netflix, that launched services in Europe 2012 and 2013, compel major industry players to focus on generating more lucrative content and this change may have an impact on local film productions. Simultaneously, the European Union and its member nations are working to attract production companies and strengthen local filmmakers, aiming to increase the competitiveness and economic contribution of their national film sectors.
4. Reviewed literature case studies reveals a clear pattern in Europe: most countries utilize tax rebate incentives for film production and assess the outcomes using descriptive, ROI based, and I-O multiplier calculations. The reviewed European cases have shown positive economic impacts on both the film industries and the respective national economies. Conversely, in the United States, specific policy instruments have been evaluated using econometric models. These models suggest that state-level film incentives are often an expensive and inefficient development strategy, raising serious concerns about the high public cost associated with each job created.
5. The existing Lithuanian tax incentive evaluation and film industry case studies indicate that a tax incentive is effective and can draw foreign investment projects. However, existing analyses of the Lithuanian tax incentive are largely reports relying on descriptive statistics and standard economic impact and cost-benefit assessments and do not try

directly establishing a clear causal relationship between the tax incentive introduced in 2014 and the expansion of the Lithuanian film industry.

6. Empirical findings confirm that the film industry functions as a strategic economic engine with a high capacity for stimulating peripheral sectors. The sectorial multiplier for Lithuania exceeds 2, indicating that the industry has successfully integrated into the domestic economy, meaning every euro of foreign investment generates more than double that value in broader economic output. This result validates the thesis hypothesis: expenditure in the Lithuanian film sector generates a significant Gross Value Added (GVA) multiplier effect.
7. Analysis of the I-O coefficients indicates that the Lithuanian film industry primarily supports sectors such as real estate and rental services, petroleum and chemical products, wholesale trade services, and advertising and market research services. Contrary to theoretical expectations and the trends observed in matured markets, the industry currently does not show strong support for logistics, hospitality, and tourism. This suggests that the Lithuanian film industry has not yet reached its full economic potential and established the significant presence typical of film industries in more developed economies, where strong links to the tourism and hospitality sectors are common.
8. The analysis of Interrupted time series model for Lithuania around the year 2014, when tax incentive was introduced in Lithuania, reveals a statistically significant positive structural break in production volume immediately following the policy intervention. The same model for Austria and Denmark shows that around 2014 film sectors stopped developing, Finland's film industry expanded at the same pace, and the Estonian sector also started to accelerate. ITS model does not confirm that Lithuanian tax incentive caused film sector growth, and sudden stagnation in Denmark and Austria may suggest wider structural changes in the market that happened around 2014.
9. TWFE Difference-in-differences analysis indicates an average treatment effect of 14,7%, suggesting that Lithuania's specific policy mix has generated nearly 15% more in GVA compared to would be expected if Lithuania had simply followed the general regional trend. This proves that Lithuanian tax incentive for film production caused the entire film sector to grow.
10. The results for the applied synthetic control method, which creates "synthetic Lithuania" mainly out of its closest neighbour Estonia, implies that Lithuania's post tax incentive GVA is about 7,5% higher than its synthetic twin. Because Estonia itself grew quickly,

this method yields a smaller but still economically meaningful gap. This narrower margin suggests that relying solely on production price competitiveness is insufficient, as neighbors with similar profiles are closely trailing Lithuania's film industry performance.

Recommendations:

1. The empirical results show that the tax incentive helped the Lithuanian film sector grow faster and catch up with other European countries. However, similar incentives are now standard across Europe, the fiscal policy instrument itself is not unique in the European Union. The incentive should therefore be kept as a basic competitiveness tool, but Lithuanian policy makers should recognise that additional measures are needed to create genuine long term support for Lithuanian film industry.
2. The expansion of Netflix and similar streaming platforms has significantly increased the demand for local language content and altered what is produced locally. This structural shift necessitates further research to understand its impact on the entire European and Lithuanian film production industry and assess the specific recommendations required within each European country to succeed in a changed market.

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Kamilė DIJOKAITĖ
Master thesis
Strategic Economics Master Study Programme

Vilnius University, Faculty of Economics and Business Administration
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Vilnius, 2026

SUMMARY

63 pages, 10 tables, 10 figures, 95 references.

The Master thesis examines the strategic potential of the film industry to drive economic growth in Lithuania, with a specific focus on evaluating the effectiveness of the fiscal tax incentive for film production introduced in 2014. In the context of the global shift towards the "new economy," Cultural and Creative Industries (CCIs) are recognized by the European Union as vital engines for innovation and sustainable development. The thesis addresses a critical scientific problem: while descriptive statistics indicate a revival in the Lithuanian film sector, there is a lack of rigorous econometric analysis to establish a causal link between the state's tax incentives and this growth.

The aim of the thesis is to fill this research gap by offering a causality assessment regarding the impact of the Lithuanian tax incentive. The methods deployed include Leontief Input-Output analysis to calculate sectorial multipliers and econometric designs: Interrupted Time Series (ITS), Two Way Fixed Effects Difference-in-Differences (TWFE DiD), and the Synthetic Control Method (SCM), processed using RStudio.

The empirical results provide robust evidence of the policy's effectiveness while highlighting structural limitations. The Input-Output analysis indicates that while the industry strongly supports real estate and advertising, it lacks the theoretical spillover into tourism and hospitality observed in mature markets, suggesting the sector has not yet reached its full economic potential. Econometrically, the ITS model detects a statistically significant positive structural break in production volume immediately following the 2014 intervention. The TWFE DiD analysis isolates a causal average treatment effect of 14,7% in Gross Value Added (GVA) compared to regional trends. However, the Synthetic Control Method yields a more conservative impact estimate of 7,5%, implying that regional competitors (specifically Estonia) are closely trailing Lithuania's performance.

Based on these findings, the thesis concludes that the tax incentive successfully accelerated Lithuania's convergence with European competitors. However, as such incentives are now standard across the EU, the policy has become a baseline requirement rather than a unique differentiator. The author recommends that policymakers retain the incentive as a hygiene factor but recognize that relying solely on price competitiveness is insufficient. Future strategy must focus on wider structural support and address the market shifts driven by global streaming platforms (e.g., Netflix), which have fundamentally altered the demand for local content.

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SANTRAUKA

63 puslapiai, 10 lentelių, 10 diagramų, 95 literatūros šaltiniai.

Magistro darbe nagrinėjamas strateginis kino industrijos potencialas skatinti Lietuvos ekonomikos augimą, ypatingą dėmesį skiriant 2014 m. įvestos pelno mokesčio lengvatos kino gamybai efektyvumo vertinimui. Pasaulinei ekonomikai transformuojantis, Europos Sąjunga vis labiau pripažįsta kultūros ir kūrybines industrijas (KKI) kaip svarbų inovacijų, aukštos pridėtinės vertės darbo vietų kūrimo ir tvaraus vystymosi variklį. Darbe sprendžiama aktuali mokslinė problema: nors aprašomoji statistika rodo Lietuvos kino sektoriaus atsigavimą, iki šiol trūko ekonometrinės analizės, pagrindžiančios priežastinį ryšį tarp valstybės taikomos mokesstinės lengvatos ir šio augimo. Todėl lieka neaišku, ar sektoriaus plėtra yra tiesioginė politinės intervencijos pasekmė, ar bendrų globalių rinkos tendencijų rezultatas.

Darbo tikslas yra užpildyti egzistuojančią tyrimų spragą, atliekant priežastinį (angl. *causality*) Lietuvos mokesstinės lengvatos poveikio kino industrijos augimui vertinimą. Siekiant šio tikslo, darbe sisteminama mokslinė literatūra apie kino politikos vertinimą, analizuojamos sektoriaus sąsajos su šalies ekonomika bei konstruojamas kontrafaktinis scenarijus grynajam politikos poveikiui nustatyti. Tyrime taikomi metodai apima mokslinės literatūros analizę ir kiekybinį modeliavimą. Naudojant Leontjevo sąnaudų ir produkcijos (angl. *Input-Output*) analizę bei Lietuvos statistikos departamento duomenis, apskaičiuoti sektoriai multiplikatoriai. Priežastiniam ryšiui nustatyti pritaikyti ekonometriniai modeliai: nutrauktos laiko eilutės (angl. *Interrupted Time Series – ITS*), dvikrypčių fiksuotų efektų skirtumų skirtumo metodas (angl. *TWFE Difference-in-Differences*) bei sintetinės kontrolės metodas (angl. *Synthetic Control Method*). Duomenys apdoroti ir modeliai sukurti naudojant „RStudio“ programinę įrangą.

Empirinio tyrimo rezultatai pateikia svarių įrodymų apie politikos efektyvumą, tačiau atskleidžia ir struktūrinius ribotumus. Sąnaudų ir produkcijos analizė rodo, kad Lietuvos kino industrija labiausiai skatina nekilnojamojo turto, didmeninės prekybos ir reklamos sektorius, tačiau, priešingai nei teoriniai modeliai ir brandžių rinkų pavyzdžiai, vis dar silpnai veikia turizmo ir apgyvendinimo sektorius. Ekonometrinė analizė patvirtina teigiamą poveikį: ITS modelis atskleidė statistiškai reikšmingą struktūrinį kino gamybos apimčių lūžį po 2014 m. *Difference-in-Differences* analizė parodė, kad dėl taikomos politikos sektoriaus bendroji pridėtinė vertė (BPV) yra vidutiniškai 14,7 % didesnė nei tikėtina pagal regionines tendencijas. Tuo tarpu sintetinės kontrolės metodas atskleidė nuosaikesnį - 7,5 % teigiamą poveikį, indikuodamas, kad kaimyninės šalys (ypač Estija) sparčiai veikia Lietuvą.

Remiantis gautais rezultatais, daroma išvada, kad mokestinė lengvata sėkmingai paspartino Lietuvos kino industrijos konvergenciją su Europos konkurentais. Visgi, kadangi panašios skatinimo priemonės tapo standartu visoje ES, ši politika tapo būtina bazine sąlyga (higienos faktoriumi), o ne unikaliu konkurenciniu pranašumu. Rekomenduojama politikos formuotojams išlaikyti lengvatą, tačiau strateginį dėmesį nukreipti į struktūrinį sektoriaus stiprinimą ir prisitaikymą prie rinkos pokyčių, kuriuos lemia globalių srautinių transliacijų platformų (pvz., „Netflix“) plėtra ir auganti vietinio turinio paklausa.

ANNEXES

Annex 1. Lithuanian sectorial multipliers

Table 9

Lithuanian sectorial multipliers in the in descending order

No	Sector name in LT	Sector name in EN	Multiplier coefficient
1	51 Oro transporto paslaugos	51 Air transport services	2.66
2	10 Maisto produktai	10 Food products	2.62
3	29 Variklinės transporto priemonės, priekabos ir puspriekabės	29 Motor vehicles, trailers and semi-trailers	2.54
4	27 Elektros įranga	27 Electrical equipment	2.41
5	79 Kelionių agentūrų, ekskursijų organizatorių ir kitos išankstinio užsakymo bei susijusios paslaugos	79 Travel agency, tour operator and other reservation services and related services	2.40
6	24 Pagrindiniai metalai	24 Basic metals	2.40
7	25 Metalo gaminiai, išskyrus mašinas ir įrenginius	25 Fabricated metal products, except machinery and equipment	2.37
8	02 Miškininkystės, medienos ruošos produktai ir susijusios paslaugos	02 Products of forestry, logging and related services	2.36
9	17 Popierius ir popieriaus gaminiai	17 Paper and paper products	2.30
10	16 Mediena bei medienos ir kamštienos gaminiai bei dirbiniai (išskyrus baldus); gaminiai iš šiaudų ir pynimo medžiagų	16 Wood and of products of wood and cork, except furniture; articles of straw and plaiting materials	2.29
11	50 Kino filmų, vaizdo įrašų ir televizijos programų kūrimo paslaugos, garso įrašymo ir muzikos įrašų leidybos paslaugos	50 Motion picture, video and television programme production services, sound recording and music publishing	2.28
12	28 Niekur kitur nepriskirtos mašinos ir įranga	28 Machinery and equipment n.e.c.	2.27
13	31 Baldai	31 Furniture	2.23
14	63 Informacinės paslaugos	63 Information services	2.22
15	26 Kompiuteriniai, elektroniniai ir optiniai gaminiai	26 Computer, electronic and optical products	2.22
16	01 Žemės ūkio, medžioklės produktai ir susijusios paslaugos	01 Products of agriculture, hunting and related services	2.19
17	23 Kiti nemetalo mineraliniai produktai	23 Other non-metallic mineral products	2.18
18	22 Guminiai ir plastikiniai gaminiai	22 Rubber and plastics products	2.15

19	95 Kompiuterių ir asmeninių bei namų ūkio reikmenų taisymo paslaugos	95 Repair services of computers and personal and household goods	2.14
20	58 Leidybos paslaugos	58 Publishing services	2.13
21	13 Tekstilės gaminiai	13 Textiles	2.13
22	03 Žuvis ir kiti žuvininkystės produktai; akvakultūros produktai; žuvininkystei būdingos paslaugos	03 Fish and other fishing products; aquaculture products; support services to fishing	2.11
23	42 Inžineriniai statiniai ir jų statybos darbai	42 Constructions and construction works for civil engineering	2.09
24	33 Mašinų ir įrangos remonto ir įrengimo paslaugos	33 Repair and installation services of machinery and equipment	2.07
25	11-12 Gėrimai ir tabako gaminiai	11-12 Beverages and tobacco products	2.06
26	75 Veterinarijos paslaugos	75 Veterinary services	2.05
27	32 Kitos pagamintos prekės	32 Other manufactured goods	2.05
28	18 Spausdinimo ir įrašymo paslaugos	18 Printing and recording services	2.05
29	30 Kitos transporto priemonės ir įranga	30 Other transport equipment	2.04
30	73 Reklamos ir rinkos tyrimo paslaugos	73 Advertising and market research services	2.04
31	93 Sporto paslaugos ir pramogų bei poilsio organizavimo paslaugos	93 Sporting services and amusement and recreation services	2.03
32	41 Pastatai ir pastatų statybos darbai	41 Buildings and building construction works	2.03
33	38-39 Tvarkymo ir šalinimo paslaugos; medžiagų atgavimo paslaugos; regeneravimo ir kitos atliekų tvarkybos paslaugos	38 Waste collection, treatment and disposal activities; materials recovery	2.02
34	49 Sausumos transporto paslaugos ir transportavimo vamzdiniais paslaugos	49 Land transport services and transport services via pipelines	2.01
35	08 Kiti kasybos ir karjerų eksploatavimo produktai	08 Other mining and quarrying products	1.96
36	56 Maitinimo ir gėrimų teikimo paslaugos	56 Food and beverage serving services	1.96
37	53 Pašto ir pasiuntinių (kurjerių) paslaugos	53 Postal and courier services	1.94
38	94 Narystės organizacijų teikiamos paslaugos	94 Services furnished by membership organisations	1.94
39	92 Azartinių žaidimų ir lažybų organizavimo paslaugos	92 Gambling and betting services	1.92
40	55 Apgyvendinimo paslaugos	55 Accommodation services	1.91
41	43 Specializuotieji statybos darbai	43 Specialised construction works	1.90
42	60 Programų rengimo ir transliavimo paslaugos	60 Programming and broadcasting services	1.90

43	D Elektros energija, dujos, garas ir oro kondicionavimas	D Electricity, gas, steam and air-conditioning	1.88
44	77 Nuomos ir išperkamosios nuomos paslaugos	77 Rental and leasing services	1.88
45	14 Drabužiai	14 Wearing apparel	1.87
46	61 Telekomunikacijų paslaugos	61 Telecommunications services	1.84
47	82 Administracinės, įstaigų ir kitos verslo aptarnavimo paslaugos	82 Office administrative, office support and other business support services	1.83
48	50 Vandens transporto paslaugos	50 Water transport services	1.82
49	70 Pagrindinių būstinių paslaugos; valdymo konsultacijų paslaugos	70 Services of head offices; management consulting services	1.82
50	74 Kitos profesinės, mokslinės ir techninės paslaugos	74 Other professional, scientific and technical services	1.82
51	46 Didmeninės prekybos, išskyrus variklinių transporto priemonių ir motociklų prekybą, paslaugos	46 Wholesale trade services, except of motor vehicles and motorcycles	1.80
52	52 Sandėliavimas ir transportui būdingos paslaugos	52 Warehousing and support services for transportation	1.80
53	81 Pastatų priežiūros ir kraštovaizdžio tvarkymo paslaugos	81 Services to buildings and landscape	1.79
54	19 Koksas ir rafinuoti naftos produktai + 20 Chemikalai ir chemijos pramonės gaminiai + 21 Pagrindiniai vaistų pramonės gaminiai ir vaistų preparatai	19 Coke and refined petroleum products + 20 Chemicals and chemical products + 21 Basic pharmaceutical products and pharmaceutical preparations	1.78
55	15 Oda ir odos gaminiai	15 Leather and related products	1.77
56	90 Kūrybinės, meninės ir pramogų organizavimo paslaugos	90 Creative, arts and entertainment services	1.76
57	45 Variklinių transporto priemonių ir motociklų didmeninės bei mažmeninės prekybos ir remonto paslaugos	45 Wholesale and retail trade and repair services of motor vehicles and motorcycles	1.72
58	65 Draudimo, perdraudimo ir pensijų lėšų kaupimo, išskyrus privalomąjį socialinį draudimą, paslaugos	65 Insurance, reinsurance and pension funding services, except compulsory social security	1.70
59	66 Finansinių ir draudimo paslaugų pagalbinės paslaugos	66 Services auxiliary to financial services and insurance services	1.66
60	37 Nuotekų valymo paslaugos	37 Sewerage	1.65
61	62 Kompiuterių programavimo, konsultacinės ir susijusios paslaugos	62 Computer programming, consultancy and related services	1.65
62	71 Architektūros ir inžinerijos paslaugos; techninio tikrinimo ir analizės paslaugos	71 Architectural and engineering services; technical testing and analysis services	1.64

63	47 Mažmeninės prekybos paslaugos, išskyrus variklinių transporto priemonių ir motociklų prekybą	47 Retail trade services, except of motor vehicles and motorcycles	1.60
64	78 Įdarbinimo paslaugos	78 Employment services	1.59
65	L Nekilnojamojo turto operacijų paslaugos, išskyrus būsto, kuriame gyvena savininkas, sąlyginė nuoma 68	L Real estate services excluding imputed rents	1.55
66	96 Kitos asmenų aptarnavimo paslaugos	96 Other personal services	1.54
67	72 Mokslinių tyrimų ir taikomosios veiklos paslaugos	72 Scientific research and development services	1.53
68	36 Gamtinis vanduo; vandens valymo ir tiekimo paslaugos	36 Natural water; water treatment and supply services	1.51
69	64 Finansinės paslaugos, išskyrus draudimą ir pensijų lėšų kaupimą	64 Financial services, except insurance and pension funding	1.51
70	87 Stacionariosios globos paslaugos	87 Residential care services	1.50
71	88 Su apgyvendinimu nesusijusios socialinio darbo paslaugos	88 Social work services without accommodation	1.50
72	68A Būsto, kuriame gyvena savininkas, sąlyginė nuoma	68A Imputed rents of owner-occupied dwellings	1.47
73	69 Teisinės ir apskaitos paslaugos	69 Legal and accounting services	1.47
74	86 Žmonių sveikatos priežiūros paslaugos	86 Human health services	1.47
75	84 Viešojo valdymo paslaugos ir gynybos paslaugos; privalomojo socialinio draudimo paslaugos	84 Public administration and defence services; compulsory social security services	1.36
76	80 Apsaugos ir tyrimo paslaugos	80 Security and investigation services	1.34
77	91 Bibliotekų, archyvų, muziejų ir kitos kultūrinės paslaugos	91 Library, archive, museum and other cultural services	1.34
78	P Švietimo paslaugos 85	P Education services	1.18
79	T Namų ūkių, samdančių darbininkus, paslaugos; namų ūkių savoms reikmėms tenkinti pagaminti nediferencijuojami gaminiai ir paslaugos 97	T Services of households as employers; undifferentiated goods and services produced by households for own use	1.00

Source: compiled by the author based on the conducted research

Annex 2. Sectors that are impacted by the Lithuanian film sector.

Table 10

Sectors that are impacted by the Lithuanian film sector.

Sector name in EN	Multiplier coefficient
50 Motion picture, video and television programme production services, sound recording and music publishing	1.15
L Real estate services excluding imputed rents	0.15
77 Rental and leasing services	0.09
19 Coke and refined petroleum products + 20 Chemicals and chemical products + 21 Basic pharmaceutical products and pharmaceutical preparations	0.08
46 Wholesale trade services, except of motor vehicles and motorcycles	0.06
73 Advertising and market research services	0.05
74 Other professional, scientific and technical services	0.05
81 Services to buildings and landscape	0.05
26 Computer, electronic and optical products	0.04
27 Electrical equipment	0.04
60 Programming and broadcasting services	0.04
31 Furniture	0.03
D Electricity, gas, steam and air-conditioning	0.03
49 Land transport services and transport services via pipelines	0.03
69 Legal and accounting services	0.03
78 Employment services	0.03
10 Food products	0.02
24 Basic metals	0.02
32 Other manufactured goods	0.02
64 Financial services, except insurance and pension funding	0.02
70 Services of head offices; management consulting services	0.02
95 Repair services of computers and personal and household goods	0.02
01 Products of agriculture, hunting and related services	0.01
11-12 Beverages and tobacco products	0.01
13 Textiles	0.01
16 Wood and of products of wood and cork, except furniture; articles of straw and plaiting materials	0.01
17 Paper and paper products	0.01
22 Rubber and plastics products	0.01
23 Other non-metallic mineral products	0.01
25 Fabricated metal products, except machinery and equipment	0.01
28 Machinery and equipment n.e.c.	0.01

29 Motor vehicles, trailers and semi-trailers	0.01
33 Repair and installation services of machinery and equipment	0.01
41 Buildings and building construction works	0.01
43 Specialised construction works	0.01
45 Wholesale and retail trade and repair services of motor vehicles and motorcycles	0.01
47 Retail trade services, except of motor vehicles and motorcycles	0.01
52 Warehousing and support services for transportation	0.01
62 Computer programming, consultancy and related services	0.01
63 Information services	0.01
82 Office administrative, office support and other business support services	0.01
90 Creative, arts and entertainment services	0.01
93 Sporting services and amusement and recreation services	0.01
02 Products of forestry, logging and related services	0
03 Fish and other fishing products; aquaculture products; support services to fishing	0
08 Other mining and quarrying products	0
14 Wearing apparel	0
15 Leather and related products	0
18 Printing and recording services	0
30 Other transport equipment	0
36 Natural water; water treatment and supply services	0
37 Sewerage	0
38 Waste collection, treatment and disposal activities; materials recovery	0
42 Constructions and construction works for civil engineering	0
50 Water transport services	0
51 Air transport services	0
53 Postal and courier services	0
55 Accommodation services	0
56 Food and beverage serving services	0
58 Publishing services	0
61 Telecommunications services	0
65 Insurance, reinsurance and pension funding services, except compulsory social security	0
66 Services auxiliary to financial services and insurance services	0
68A Imputed rents of owner-occupied dwellings	0
71 Architectural and engineering services; technical testing and analysis services	0
72 Scientific research and development services	0
75 Veterinary services	0

79 Travel agency, tour operator and other reservation services and related services	0
80 Security and investigation services	0
84 Public administration and defence services; compulsory social security services	0
P Education services	0
86 Human health services	0
87 Residential care services	0
88 Social work services without accommodation	0
91 Library, archive, museum and other cultural services	0
92 Gambling and betting services	0
94 Services furnished by membership organisations	0
96 Other personal services	0
T Services of households as employers; undifferentiated goods and services produced by households for own use	0

Source: compiled by the author based on the conducted research

Annex 3. Data set for TWFE DiD model

Table 10

Data set for TWFE DiD model

Country	Year	GVA_J59_60	GDP_per_capita	Policy
Lithuania	2005	48.400	9940.000	0
Lithuania	2006	57.100	10850.000	0
Lithuania	2007	79.000	12190.000	0
Lithuania	2008	73.900	12640.000	0
Lithuania	2009	64.200	10880.000	0
Lithuania	2010	54.400	11160.000	0
Lithuania	2011	60.000	12140.000	0
Lithuania	2012	63.500	12830.000	0
Lithuania	2013	67.700	13480.000	0
Lithuania	2014	74.100	14100.000	1
Lithuania	2015	80.200	14630.000	1
Lithuania	2016	85.700	15200.000	1
Lithuania	2017	97.600	16090.000	1
Lithuania	2018	106.300	17030.000	1
Lithuania	2019	120.200	17870.000	1
Lithuania	2020	112.200	17890.000	1
Lithuania	2021	137.100	19040.000	1
Lithuania	2022	153.100	19350.000	1
Lithuania	2023	173.000	19220.000	1
Lithuania	2024	180.900	19690.000	1
Estonia	2005	37.500	15400.000	0
Estonia	2006	43.700	17010.000	0
Estonia	2007	54.600	18400.000	0
Estonia	2008	57.300	17510.000	0
Estonia	2009	54.000	14980.000	0
Estonia	2010	54.900	15380.000	0
Estonia	2011	61.100	16590.000	0
Estonia	2012	57.900	17260.000	0
Estonia	2013	62.600	17630.000	0
Estonia	2014	67.100	18280.000	0
Estonia	2015	76.200	18650.000	0
Estonia	2016	83.000	19190.000	1
Estonia	2017	86.400	20270.000	1
Estonia	2018	90.700	20970.000	1
Estonia	2019	100.400	21650.000	1
Estonia	2020	87.300	20960.000	1

Estonia	2021	130.200	22670.000	1
Estonia	2022	212.100	22370.000	1
Estonia	2023	226.700	21210.000	1
Estonia	2024	142.700	21060.000	1
Poland	2005	1301.500	8080.000	0
Poland	2006	1314.200	8590.000	0
Poland	2007	1740.100	9170.000	0
Poland	2008	2264.500	9570.000	0
Poland	2009	1622.100	9810.000	0
Poland	2010	1569.800	10150.000	0
Poland	2011	1672.300	10680.000	0
Poland	2012	1626.600	10840.000	0
Poland	2013	1816.600	10930.000	0
Poland	2014	1885.900	11360.000	0
Poland	2015	2119.700	11870.000	0
Poland	2016	2077.800	12240.000	0
Poland	2017	1916.100	12870.000	0
Poland	2018	2039.700	13680.000	0
Poland	2019	2080.500	14310.000	1
Poland	2020	1712.800	14310.000	1
Poland	2021	2730.400	15380.000	1
Poland	2022	2821.300	15840.000	1
Poland	2023	2869.400	15950.000	1
Poland	2024		16470.000	1
Czechia	2005	532.300	16180.000	0
Czechia	2006	615.200	17200.000	0
Czechia	2007	711.600	18050.000	0
Czechia	2008	791.600	18330.000	0
Czechia	2009	698.100	17350.000	0
Czechia	2010	767.200	17770.000	1
Czechia	2011	807.100	18120.000	1
Czechia	2012	774.900	17970.000	1
Czechia	2013	761.000	17970.000	1
Czechia	2014	720.200	18370.000	1
Czechia	2015	829.000	19270.000	1
Czechia	2016	915.200	19760.000	1
Czechia	2017	1005.600	20760.000	1
Czechia	2018	1098.100	21320.000	1
Czechia	2019	1160.900	22050.000	1
Czechia	2020	1036.500	20980.000	1
Czechia	2021	1241.200	21830.000	1
Czechia	2022	1348.800	21910.000	1

Czechia	2023	1526.300	21680.000	1
Czechia	2024	1541.000	21910.000	1
Finland	2005	705.000	40680.000	0
Finland	2006	659.000	42150.000	0
Finland	2007	748.000	44210.000	0
Finland	2008	779.000	44350.000	0
Finland	2009	794.000	40570.000	0
Finland	2010	847.000	41660.000	0
Finland	2011	853.000	42460.000	0
Finland	2012	823.000	41620.000	0
Finland	2013	814.000	41020.000	0
Finland	2014	874.000	40650.000	0
Finland	2015	911.000	40700.000	0
Finland	2016	906.000	41640.000	0
Finland	2017	950.000	42910.000	1
Finland	2018	1010.000	43360.000	1
Finland	2019	1020.000	43910.000	1
Finland	2020	992.000	42740.000	1
Finland	2021	1056.000	43800.000	1
Finland	2022	1081.000	44010.000	1
Finland	2023	1121.000	43440.000	1
Finland	2024	1187.000	43280.000	1
Slovenia	2005	114.300	18610.000	0
Slovenia	2006	123.900	19640.000	0
Slovenia	2007	127.400	20930.000	0
Slovenia	2008	138.300	21600.000	0
Slovenia	2009	129.600	19770.000	0
Slovenia	2010	132.100	19920.000	0
Slovenia	2011	132.200	20010.000	0
Slovenia	2012	146.200	19390.000	0
Slovenia	2013	117.300	19210.000	0
Slovenia	2014	118.700	19720.000	0
Slovenia	2015	116.500	20170.000	0
Slovenia	2016	120.900	20770.000	0
Slovenia	2017	140.700	21830.000	0
Slovenia	2018	162.100	22720.000	1
Slovenia	2019	172.900	23330.000	1
Slovenia	2020	159.900	22230.000	1
Slovenia	2021	190.900	24040.000	1
Slovenia	2022	204.400	24660.000	1
Slovenia	2023	223.000	25120.000	1
Slovenia	2024	227.800	25480.000	1

Hungary	2005	496.000	11050.000	1
Hungary	2006	555.600	11500.000	1
Hungary	2007	721.900	11550.000	1
Hungary	2008	668.000	11690.000	1
Hungary	2009	706.400	10920.000	1
Hungary	2010	877.400	11060.000	1
Hungary	2011	822.900	11300.000	1
Hungary	2012	807.600	11220.000	1
Hungary	2013	719.300	11490.000	1
Hungary	2014	680.800	12040.000	1
Hungary	2015	541.400	12530.000	1
Hungary	2016	444.600	12880.000	1
Hungary	2017	568.700	13460.000	1
Hungary	2018	567.000	14240.000	1
Hungary	2019	599.200	14980.000	1
Hungary	2020	523.600	14370.000	1
Hungary	2021	622.400	15470.000	1
Hungary	2022	579.700	16160.000	1
Hungary	2023	689.100	16050.000	1
Hungary	2024	791.900	16190.000	1
Croatia	2005	146.100	11020.000	0
Croatia	2006	162.300	11570.000	0
Croatia	2007	185.900	12160.000	0
Croatia	2008	188.900	12400.000	0
Croatia	2009	168.800	11570.000	0
Croatia	2010	190.100	11440.000	0
Croatia	2011	197.100	11470.000	0
Croatia	2012	197.100	11270.000	1
Croatia	2013	189.700	11340.000	1
Croatia	2014	177.400	11370.000	1
Croatia	2015	189.300	11760.000	1
Croatia	2016	221.100	12320.000	1
Croatia	2017	245.700	12910.000	1
Croatia	2018	254.700	13460.000	1
Croatia	2019	303.100	14020.000	1
Croatia	2020	279.600	12980.000	1
Croatia	2021	292.900	14750.000	1
Croatia	2022	363.600	15900.000	1
Croatia	2023	374.400	16490.000	1
Croatia	2024	322.700	17060.000	1
Denmark	2005	974.100	49780.000	0
Denmark	2006	929.100	51510.000	0

Denmark	2007	929.200	51790.000	0
Denmark	2008	1049.800	51270.000	0
Denmark	2009	1003.300	48460.000	0
Denmark	2010	1136.800	49010.000	0
Denmark	2011	1209.500	49440.000	0
Denmark	2012	1413.500	49260.000	0
Denmark	2013	1462.500	49750.000	0
Denmark	2014	1532.200	50110.000	0
Denmark	2015	1587.900	50810.000	0
Denmark	2016	1666.800	51950.000	0
Denmark	2017	1640.700	53200.000	0
Denmark	2018	1695.500	53920.000	0
Denmark	2019	1599.200	54630.000	0
Denmark	2020	1488.700	53540.000	0
Denmark	2021	1692.200	56780.000	0
Denmark	2022	1686.400	56530.000	0
Denmark	2023	1645.500	56470.000	0
Denmark	2024	1711.200	58160.000	0
Austria	2005	840.90	40270.00	0
Austria	2006	854.70	41370.00	0
Austria	2007	867.40	42790.00	0
Austria	2008	916.40	43270.00	0
Austria	2009	952.90	41620.00	0
Austria	2010	911.40	42280.00	0
Austria	2011	969.50	43370.00	0
Austria	2012	1099.30	43450.00	0
Austria	2013	1130.40	43080.00	0
Austria	2014	1152.40	43070.00	0
Austria	2015	1194.40	43200.00	0
Austria	2016	1222.30	43550.00	0
Austria	2017	1232.10	44260.00	0
Austria	2018	1250.20	45140.00	0
Austria	2019	1280.80	45730.00	0
Austria	2020	1179.40	42650.00	0
Austria	2021	1155.20	44580.00	0
Austria	2022	1263.50	46430.00	0
Austria	2023	1320.60	45670.00	1
Austria	2024	1319.50	45140.00	1

Source: compiled by the author based on the conducted research

Annex 4. Data set for Synthetic control method

Table 11

Data set for Synthetic control method

Country	Year	GVA_J59_60	GDP_per_capita	Policy
Lithuania	2005	48.400	9940.000	0
Lithuania	2006	57.100	10850.000	0
Lithuania	2007	79.000	12190.000	0
Lithuania	2008	73.900	12640.000	0
Lithuania	2009	64.200	10880.000	0
Lithuania	2010	54.400	11160.000	0
Lithuania	2011	60.000	12140.000	0
Lithuania	2012	63.500	12830.000	0
Lithuania	2013	67.700	13480.000	0
Lithuania	2014	74.100	14100.000	1
Lithuania	2015	80.200	14630.000	1
Lithuania	2016	85.700	15200.000	1
Lithuania	2017	97.600	16090.000	1
Lithuania	2018	106.300	17030.000	1
Lithuania	2019	120.200	17870.000	1
Lithuania	2020	112.200	17890.000	1
Lithuania	2021	137.100	19040.000	1
Lithuania	2022	153.100	19350.000	1
Lithuania	2023	173.000	19220.000	1
Lithuania	2024	180.900	19690.000	1
Estonia	2005	37.500	15400.000	0
Estonia	2006	43.700	17010.000	0
Estonia	2007	54.600	18400.000	0
Estonia	2008	57.300	17510.000	0
Estonia	2009	54.000	14980.000	0
Estonia	2010	54.900	15380.000	0
Estonia	2011	61.100	16590.000	0
Estonia	2012	57.900	17260.000	0
Estonia	2013	62.600	17630.000	0
Estonia	2014	67.100	18280.000	0
Estonia	2015	76.200	18650.000	0
Estonia	2016	83.000	19190.000	1
Estonia	2017	86.400	20270.000	1
Estonia	2018	90.700	20970.000	1
Estonia	2019	100.400	21650.000	1
Estonia	2020	87.300	20960.000	1

Estonia	2021	130.200	22670.000	1
Estonia	2022	212.100	22370.000	1
Estonia	2023	226.700	21210.000	1
Estonia	2024	142.700	21060.000	1
Poland	2005	1301.500	8080.000	0
Poland	2006	1314.200	8590.000	0
Poland	2007	1740.100	9170.000	0
Poland	2008	2264.500	9570.000	0
Poland	2009	1622.100	9810.000	0
Poland	2010	1569.800	10150.000	0
Poland	2011	1672.300	10680.000	0
Poland	2012	1626.600	10840.000	0
Poland	2013	1816.600	10930.000	0
Poland	2014	1885.900	11360.000	0
Poland	2015	2119.700	11870.000	0
Poland	2016	2077.800	12240.000	0
Poland	2017	1916.100	12870.000	0
Poland	2018	2039.700	13680.000	0
Poland	2019	2080.500	14310.000	1
Poland	2020	1712.800	14310.000	1
Poland	2021	2730.400	15380.000	1
Poland	2022	2821.300	15840.000	1
Poland	2023	2869.400	15950.000	1
Poland	2024		16470.000	1
Finland	2005	705.000	40680.000	0
Finland	2006	659.000	42150.000	0
Finland	2007	748.000	44210.000	0
Finland	2008	779.000	44350.000	0
Finland	2009	794.000	40570.000	0
Finland	2010	847.000	41660.000	0
Finland	2011	853.000	42460.000	0
Finland	2012	823.000	41620.000	0
Finland	2013	814.000	41020.000	0
Finland	2014	874.000	40650.000	0
Finland	2015	911.000	40700.000	0
Finland	2016	906.000	41640.000	0
Finland	2017	950.000	42910.000	1
Finland	2018	1010.000	43360.000	1
Finland	2019	1020.000	43910.000	1
Finland	2020	992.000	42740.000	1
Finland	2021	1056.000	43800.000	1
Finland	2022	1081.000	44010.000	1

Finland	2023	1121.000	43440.000	1
Finland	2024	1187.000	43280.000	1
Denmark	2005	974.100	49780.000	0
Denmark	2006	929.100	51510.000	0
Denmark	2007	929.200	51790.000	0
Denmark	2008	1049.800	51270.000	0
Denmark	2009	1003.300	48460.000	0
Denmark	2010	1136.800	49010.000	0
Denmark	2011	1209.500	49440.000	0
Denmark	2012	1413.500	49260.000	0
Denmark	2013	1462.500	49750.000	0
Denmark	2014	1532.200	50110.000	0
Denmark	2015	1587.900	50810.000	0
Denmark	2016	1666.800	51950.000	0
Denmark	2017	1640.700	53200.000	0
Denmark	2018	1695.500	53920.000	0
Denmark	2019	1599.200	54630.000	0
Denmark	2020	1488.700	53540.000	0
Denmark	2021	1692.200	56780.000	0
Denmark	2022	1686.400	56530.000	0
Denmark	2023	1645.500	56470.000	0
Denmark	2024	1711.200	58160.000	0

Source: compiled by the author based on the conducted research