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Content Quota, Tariff, and Investment Obligation in the Audiovisual Market*

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Abstract

The rise of online streaming platforms, led by US giants like Netflix and Amazon, poses economic and cultural challenges. Policymakers globally, including European Union (EU) Member States, have implemented protective measures, such as content quotas and investment obligations, to preserve local content and cultural identity. These measures have also been advocated for in other countries, such as Australia, New Zealand, Canada, Mexico, and South Africa. We develop a model evaluating the implications of those policies on social welfare, with the goal of comparing the relative effectiveness of each intervention in promoting local content and exploring possible conflicts that might arise against other welfare measures. We also consider a content tariff as an alternative measure, which becomes relevant especially with the United States (US) government recently contemplating a 100% tariff on foreign movies and those produced outside the country as a reaction to related policies by other countries. We demonstrate how the outcomes of each intervention, to varying degrees, depend on viewers' composition in a country regarding their preferences for domestic and foreign content as well as their demand elasticity. Our findings highlight the importance of tailoring cultural policy to audience preferences and suggest how those policies can be more effectively designed.

Keywords: *audiovisual market, content quota, cultural goods, digital economy, investment obligation, streaming platform, tariff*
JEL Codes: *D420, F130, L120, L140, L510, Z110*

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1 Introduction

In this chapter, we analyse the implications of content quotas and investment obligations for consumer welfare in the audiovisual market of an international digital economy. We also examine a tariff on foreign content as an alternative policy. The objective is to compare the relative effectiveness of these interventions in promoting domestic content and enhancing consumer welfare. In a model adapted to the context of digital content delivery, we consider a foreign platform that streams both domestic and foreign Video-on-Demand (VOD) content to a national audience. We then show how the welfare effects of each policy may depend on the composition of local viewers, particularly their preferences for domestic versus foreign content.

The presence of online streaming platforms has changed the landscape of the audiovisual market in recent decades. Television channels used to be the sole providers of audiovisual content, and viewers only had a few alternatives when choosing programs on air. The VOD market, dominated by US players such as Netflix, Amazon, Disney, and HBO, nowadays presents viewers with a myriad of alternatives, including transnational content, conveniently increasing their access to foreign content. However, just as the trade of tangible goods benefits economies in various ways while posing some challenges in others, these changes brought by digitalisation in the media industry do not come without a cost. Consumption of foreign instead of domestic content through foreign platforms means an outflow of economic rents from a country, while persistent exposure to foreign content may put nations at risk of losing their cultural identities. As a result, policymakers around the world, such as member states of the European Union (EU), Australia, Canada, Mexico, New Zealand and South Africa, have been advocating for protective measures for local content for economic and cultural reasons.[1]

To protect European media players, the EU has taken measures, mainly in the form of content quotas and investment obligations, to shield their industry from global influences while encouraging pan-European distribution and production.

> Article 13(1) of the revised Audiovisual Media Services Directive (AVMSD) stipulates that member states must ensure that providers of on-demand audiovisual media services under their jurisdiction secure a minimum 30% share of European works in their catalogues, as well as the prominence of these works. Article 13(2) stipulates that member states may require providers of on-demand audiovisual media services under their jurisdiction to contribute financially to the production of European works. This can happen through direct investments in content, such as the acquisition of rights or (co)productions or contributions to national funds. [Iordache et al. (2022), p.549]

Against the initial purpose, it has been claimed that these policies primarily focus on content production but provide limited support for the circulation and distribution of intra-European content. According to the European Audiovisual Observatory (2023), the market share of European films in cinemas in 2018 was 29.4%, while that of the US reached 63.2%, suggesting the audience's high demand for US content. Four years later, and while the

[1]Some of the countries are particularly concerned about cultural threats, while others, like New Zealand, appear to aim mainly at creating a level playing field in their media industry. Please refer to the relevant discussion document prepared by New Zealand's Minister for Media and Communications (2025).

AVMSD had already been in force for two years, the share of European films and TV content in VOD catalogues in 25 EU countries only reached 32%, of which only 21% was of EU27 origin, with no guarantee that subscribers would watch them. Meanwhile, US works still represented almost half of all works in VOD catalogues (49%). This condition is aggravated by the fact that the European online streaming market is dominated by three US over-the-top (OTT) platforms, that is, Netflix, Amazon, and Disney+, taking 71% of VOD subscriptions. In addition to hosting licensed content, these platforms also produce their own content, intensifying the existing pressure on European content production as these platforms, if unregulated, can prioritise displaying their own over local content.[2]

In contrast to physical goods, regulating trade in digital products, such as videos and related content, presents novel challenges, primarily stemming from their intangible nature and the dynamic characteristics of these products. Moreover, digital products are hard to classify because they possess traditional characteristics of both goods and services. Difficulties in monitoring activities involving intangible digital products add to the reason why regulation in the trade of digital products is minimal and fragmented. As the inconsistent and fragmented rules continue across the globe, and with the World Trade Organization's (WTO) moratorium on e-commerce tariffs coming to an end, this issue becomes more relevant than ever, urgently calling for policy interventions. This is reflected especially with the ongoing tariff wars, as the United States (US) government has recently reacted to related policies by other countries by threatening to impose a 100% tariff on foreign films or those produced outside the country.[3]

Fleuter (2016) claims that digital products should be treated as services and, therefore, be governed by the General Agreement on Trade in Services (GATS). Zheng (2019) suggests that the global trade community should prioritise discussions regarding fundamental framework regulations and the application of universally acknowledged legal principles from the WTO to govern digital commerce and focus on impactful non-tariff barriers to digital trade. Meanwhile, the WTO's Committee on Technical Barriers to Trade (TBT) has suggested two potential approaches: explicitly stating that intangible digital goods fall under the responsibilities outlined in TBT regulations or incorporating TBT regulations into digital agreements. In either case, the recommendation is to encourage consistent regulations through international standards or, at least, to foster consistency and prevent unnecessary trade barriers (World Trade Organization, 2023).

Quotas and tariffs are generally perceived as protective measures that often hinder competition and can discourage innovation in the domestic market. In contrast, joint investments are often seen as an instrument that can help reduce production costs and improve the quality of domestic products while potentially generating positive spillover effects through learning. Being a shareholder in domestic content production is also expected to increase the incentive for the streaming platforms to accommodate domestic content. This study shows that each of the policies affects the share of domestic content featured by the streaming platform in different ways. When a policy raises domestic content share, it only enhances consumer welfare if viewers, in general, prefer domestic content over foreign content. In such a case, the

[2]Aguiar and Waldfogel (2018) study empirically how the theatrical distribution strongly advantages US-origin fare and how many countries are relatively advantaged by their Netflix availability patterns, posing a vertical threat to content providers.

[3]Please refer to Goldman, David (2025), and Shalal, Andrea and Reid, Tim (2025).

change in content composition in favour of the majority of people in the country is followed by an increase in the subscription fee. Therefore, viewers' home bias must not be too strong to prevent the platform from exploiting them by charging an excessively high subscription fee. In contrast, the policies harm overall consumer welfare when most people value foreign content more than domestic content.

Trade regulation of cultural products has been debated since the era of TV and radio, but the rise of global streaming platforms has reignited the issue. Several previous studies have demonstrated results similar to our findings, for example, Crampes and Hollander (2008) in the TV broadcasting context and Richardson (2006) in a radio station setting. While some others like Francois and Van Ypersele (2002) and Rauch and Trindade (2009) have also demonstrated the possibility of effective protection of cultural goods, most agree that policymakers should consider the effects of heterogeneous valuations within the population in debates on the merits of cultural protection. Our study contributes to the existing literature by looking at the contemporary audiovisual market involving digital streaming platforms. It stands out by comprehensively investigating several instruments simultaneously, including a content tariff, which is yet to be envisaged but has the potential to gain popularity with the ongoing tariff wars. Finally, to the best of our knowledge, our work is also the first to explore the economic implications of investment obligations in the movie industry.

Closely Related Literature Media have been known to influence perceptions, and movies, in particular, can affect cultural values (Yan et al., 2024). The possibility of cultural divergence, whereby the distributions of cultures become more dissimilar across countries, and one of the cultures may disappear, has also been pointed out by, among others, Olivier et al. (2008). Disdier et al. (2010) claim that cultural goods and services embody national identities and personal diversity and, therefore, should not be governed by the general rules of GATT/WTO, as this could lead to a global homogenisation of preferences and behaviours.

Research into the economics of the film industry has not yet gained widespread traction in industrial organisation and general economics (McKenzie, 2023), much less in relation to the recently imposed measures. Vlassis (2023) argues that the governance of audiovisual media should not be perceived as a fixed strategy in today's power dynamics between streaming platforms and other stakeholders but rather as an ongoing process characterised by a constant game of bargaining, exchanges, and political confrontations. We explore several alternative strategies to address the issue of foreign dominance over domestic culture, taking into account the market situation from both consumers' and producers' sides to provide insights into how each intervention may or may not lead to the desired outcomes.

Iordache et al. (2022) specifically suggest that a more effective regulatory framework for dealing with these platforms is likely to be the EU's competition and trade policy rather than its audiovisual measures. While content quotas are equivalent to the minimum local content requirement often enforced by governments in dealing with international trade, their welfare implications in the audiovisual context might have been under-explored, as is the case with investment obligations. Using an economic model currently missing in this area, we seek to answer questions about the necessity of the instruments and, further, to offer insights on their potential effects.

In the audiovisual market, demand for imported films is influenced not only by cultural

differences but also by the strategic actions of global distributors (Holloway, 2017), including content quality (Holloway, 2014), as well as bilateral and global fixed costs (Hanson and Xiang, 2011) and other trade barriers (Jane et al., 2015; Parc and Messerlin, 2018). We argue that one of the possible explanations for the limited effect of the audiovisual measures on pan-European content distribution is that consumers have home-biased or foreign-biased preferences that are often hard to change. Moreover, the imposed measure in the form of a quota may discourage innovation, as a guaranteed share of local content provides less incentive for local content producers to improve their content quality. This occurrence has been discussed by Iordache et al. (2023), claiming that the quotas are mainly quantitative measures, focusing on the production of content, overlooking the quality standards. Yue (2022) shows that non-tariff measures impose minimum quality standards while informing consumers about import quality, predicting how these competing effects can force exit.

While much attention has been devoted to unravelling different effects of trade barriers in the context of physical goods, little is known about their effects when applied to intangible digital goods. We contribute to the sparse literature on the regulation of digital products by exploring the possible outcomes of several interventions in the audiovisual market. Traditionally, it is known in the literature that tariffs and quotas are equivalent in a Cournot game (Anderson and Schmitt, 2003), and that tariffs and non-tariff measures (NTMs) are substitutes (Niu et al., 2020; Meiling Kang and Li, 2022; Kuenzel, 2020). Anderson and Schmitt (2003) further establish a result that roughly aligns with the real-life progression of trade policies adoption in the US: governments prefer tariffs the most, followed by quotas and anti-dumping constraints being the least preferred. Melitz (2005), in contrast, shows that under some reasonable restrictions, quotas may lead to a higher welfare level than tariffs and may even be preferred to a domestic production subsidy. These conventions might differ in a digital economy, especially when the goods are transacted on a per-user rather than per-unit basis, which becomes an interesting feature of our study.

In favour of trade liberalisation, several organisations and national governments started debating the idea of imposing responsibilities on VOD streaming platforms, claiming that they violate countries' free-trade commitments under various agreements, such as the United States-Mexico-Canada Agreement (USMCA) or the Australia-United States Free Trade Agreement (AUSFTA). In contrast, investment obligations have appeared to manifest their positive effects as the academic literature acknowledges the substantial financial contribution of global VOD streaming platforms to funding and investing in creating national cultural content worldwide (Vlassis, 2023). Melitz (2005) further suggests that the decision to protect the industry should depend on how local industries benefit from the learning externalities and how foreign goods can substitute for domestic goods. We find that either claim could hold, depending on the composition of viewers in a country and the interactions among other players, including streaming platforms and content producers.

2 The Model

We start by investigating the case without policy interventions. A foreign monopoly streaming platform hosts a fraction $\alpha \in [0, 1]$ of domestic content produced in the domestic country, as well as a fraction $1 - \alpha$ of foreign content produced abroad, including the platform's

in-house produced content. In the absence of regulation, α is strategically chosen by the platform.

Viewers are heterogeneous in taste, each exogenously assigned to either the domestic captive or foreign captive group.[4] A fraction $\lambda \in [0,1]$ of viewers is captive to domestic content and, hence, constitutes domestic captives, and the rest, $1-\lambda$, to foreign content, hence, is foreign captives. We denote domestic captive viewers with superscript d and foreign captive viewers with superscript f.

A subscription fee of p gives viewers full access to all content on the platform, but they only benefit from their preferred content; that is, each viewer in each group derives different utilities from consuming content: $U^d(\alpha,p)$ for domestic captives, and $U^f(\alpha,p)$ for foreign captives.[5] Their respective utility functions satisfy the properties stated in the following assumption.

Assumption 1 $U^d_\alpha > 0, U^f_\alpha < 0; U^d_p < 0, U^f_p < 0; U^d_{\alpha\alpha} < 0, U^f_{\alpha\alpha} < 0; U^d_{pp} < 0, U^f_{pp} < 0.$

The assumption implies that the utility of domestic captives (foreign captives) is strictly increasing in the share of featured domestic (foreign) content, and strictly decreasing in the subscription fee. Both utility functions are strictly concave in the share of domestic content and subscription fee. The utility functions allow us to derive the demand for the platform subscription stemming from each group, $x^d(\alpha,p)$ and $x^f(\alpha,p)$, respectively.

Note that the viewers' exogenous assignment into either of the two groups is the only heterogeneity in consumers' preferences we consider. The actual demand stemming from each group can be represented as a weighted demand for subscriptions from that group. Define this demand from group $i = \{d,f\}$ as $\lambda^i x^i(\alpha,p)$ if $U^i(\alpha,p) > 0$, and zero otherwise, where $\lambda^i = \lambda$, and $\lambda^{-i} = 1-\lambda$. Denote $x(\alpha,p) = \lambda x^d(\alpha,p) + (1-\lambda)x^f(\alpha,p)$ as the aggregate demand for subscription across both groups of viewers, satisfying the following assumption.

Assumption 2 *$x(\alpha,p)$ is smooth and twice continuously differentiable.*

For simplicity, assume that there is only one domestic content producer and the functions for the content royalties are not to be chosen strategically.[6] The platform's total cost of acquiring content is given by $r(\alpha) = \theta r^d(\alpha) + r^f(\alpha)$, where $r^d(\alpha)$ and $r^f(\alpha)$ are the license fees

[4] In this model, we assume that viewers' assignment into either of the two groups is exogenous. One might argue that preferences may evolve as viewers become more or less exposed to a certain type of content, for which the government might have an incentive to implement strategies that may shift viewers' preferences toward domestic content. This can be modelled, for example, by employing a dynamic model or including a shock parameter in the viewers' type to capture the changes in preferences. We abstract from such a situation in this study and leave it for future work.

[5] This difference in utilities can alternatively be interpreted as follows. Streaming platforms regularly update their catalogues and viewers care about type of new movies added; since platforms are capacity-constrained, adding more of one type of movie implies less room for other kinds, affecting viewers differently. Francois and Van Ypersele (2002) exhibit some degree of similarities to ours in modelling consumer preferences. Their study considers homogeneously valued (Hollywood) movies and heterogeneously valued American (non-Hollywood) and French movies in each country, known as symmetric auteur, which is heterogeneously valued domestically and has little international appeal. As an illustration, some French are willing to pay a large premium to watch a French film instead of a Hollywood offering, whereas others would prefer Hollywood films at almost any price, while the producer cannot price discriminate.

[6] Royalties should ideally be a result of a bargaining process between streaming platforms and content producers, but in this model, we abstract from this and assume that the total royalty payments be strictly increasing (decreasing) and convex in α for domestic (foreign) content.

(royalties) paid for domestic and foreign content, respectively, and $\theta \in [0, \Theta]$ is a parameter measuring the relative efficiency of the domestic producer; when $\theta \in [0, 1)$, the domestic producer is more efficient than average foreign producers, and less efficient otherwise.[7] Furthermore, assume the cost functions to satisfy the following properties, so that the difference between the costs of acquiring domestic and foreign movies is captured solely by θ.

Assumption 3 $r^d_\alpha(\alpha) = -r^f_\alpha(\alpha) = r_\alpha(\alpha) > 0$, $r_{\alpha\alpha}(\alpha) > 0$.

The properties above imply that the cost of acquiring domestic content (i.e., royalties for domestic content) is increasing in the share of domestic content, and that of foreign content is increasing in the share of foreign content. Both cost functions are convex in the share of domestic content. The partial derivative of one cost function mirrors the other, so that in the special case of $\theta = 1$, the marginal cost of acquiring both types of content is identical.

Thus, the problem of the foreign streaming platform is given by:

$$\underset{\alpha,p}{\text{Max}}\ \Pi = px(\alpha, p) - r(\alpha) \tag{1}$$

Assume that the profit function is concave in both α and p, ensuring a unique solution. Specifically, we make the following assumptions to guarantee the existence and uniqueness of the platform's optimal choice in both the regulated and unregulated scenarios.

Assumption 4 $\Pi_\alpha(\alpha, p) \geq 0$, $\Pi_p(\alpha, p) \geq 0$; $\Pi_{\alpha\alpha}(\alpha, p) < 0$, $\Pi_{pp}(\alpha, p) < 0$; $\Pi_{\alpha\alpha}\Pi_{pp} - \Pi_{\alpha p}\Pi_{p\alpha} > 0$.

The solution to the platform's problem satisfies the following first-order conditions:

$$\Pi_p(\alpha, p) = \frac{d\Pi}{dp} = px_p(\alpha, p) + x(\alpha, p) = 0 \tag{2.1}$$

$$\Pi_\alpha(\alpha, p) = \frac{d\Pi}{d\alpha} = px_\alpha(\alpha, p) + (1 - \theta)r_\alpha(\alpha) = 0 \tag{2.2}$$

where $x_p(\alpha, p) = \lambda x^d_p(\alpha, p) + (1 - \lambda)x^f_p(\alpha, p) < 0$ is viewers' demand sensitivity to changes in the subscription fee, and $x_\alpha(\alpha, p) = \lambda x^d_\alpha(\alpha, p) + (1 - \lambda)x^f_\alpha(\alpha, p)$ represents their sensitivity to changes in the share of featured domestic content.

Define the threshold for the ratio between domestic and foreign captives based on the sensitivity of demand to changes in the share of featured domestic content, $\hat{\lambda}$, as follows:

$$\frac{\lambda}{1 - \lambda} = \left| \frac{x^f_\alpha}{x^d_\alpha} \right| \equiv \hat{\lambda} \tag{3}$$

This ratio corresponds to the 'neutral point,' which occurs when a change in α affects the aggregate demand from domestic and foreign captives with the same magnitude, so that its total effect is zero, that is, $x_\alpha(\alpha, p) = 0$. Moreover, note $x_\alpha(\alpha, p) \gtrless 0$ if $\frac{\lambda}{1-\lambda} \gtrless \hat{\lambda}$. We call the situation where the ratio between domestic and foreign captives is larger than the neutral point as viewers' composition being *first-order home-biased* and the opposite being *first-order foreign-biased*. Viewers' composition is *balanced* when the ratio between domestic

[7] This efficiency measure can also be equivalently interpreted in terms of inverse of content quality.

and foreign captives is equal to the neutral point. Therefore, the total effect of a change in α on the aggregate demand is positive when viewers are first-order home-biased, i.e., when $\frac{\lambda}{1-\lambda} > \hat{\lambda}$, and negative otherwise.

Define another condition based on the second-order sensitivity of the demand as follows:

$$\frac{\lambda}{1-\lambda} = \left|\frac{x^f_{p\alpha}(\alpha,p)}{x^d_{p\alpha}(\alpha,p)}\right| = \left|\frac{x^f_{\alpha p}(\alpha,p)}{x^d_{\alpha p}(\alpha,p)}\right| \equiv \hat{\hat{\lambda}} \tag{4}$$

Note $x_{p\alpha}(\alpha,p) = x_{\alpha p}(\alpha,p) \gtreqless 0$ if $\frac{\lambda}{1-\lambda} \gtreqless \hat{\hat{\lambda}}$. $x_{p\alpha}(\alpha,p)$ measures how content composition affects the price sensitivity of the demand of each group, whether a change in content composition makes their demands more or less sensitive to price. $x_{\alpha p}(\alpha,p)$, accordingly, measures how subscription fee affects the content sensitivity of each group, whether a change in the fee makes their demands more or less sensitive to content composition. Since $x_p(\alpha,p) < 0$, $x_{p\alpha}(\alpha,p) > 0$ means that an increase in α makes $x_p(\alpha,p)$ less negative, i.e., demand is less sensitive to price. Since $x_{p\alpha}(\alpha,p) = x_{\alpha p}(\alpha,p)$, the logic follows in an analogous way for $x_{\alpha p}(\alpha,p)$.

We refer to $\frac{\lambda}{1-\lambda} > \hat{\hat{\lambda}}$ as a condition corresponding to viewers' composition being *second-order home-biased*, and the reverse being *second-order foreign-biased*. Note that $\hat{\hat{\lambda}}$ is lower when $x^d_{p\alpha}(\alpha,p)$ is higher, that is, when an increase in the share of domestic content reduces the price-sensitivity of demand from domestic captives by a huge amount, making $\frac{\lambda}{1-\lambda} > \hat{\hat{\lambda}}$ more likely to be satisfied. In the extreme case of $x^d_{p\alpha}(\alpha,p) \to \infty$, an increase in α makes domestic demand becomes completely irresponsive to any price change, $\hat{\hat{\lambda}} \to 0$, so $\frac{\lambda}{1-\lambda} > \hat{\hat{\lambda}}$ always holds, implying amplified home bias.

We use the thresholds $\hat{\lambda}$ and $\hat{\hat{\lambda}}$ to identify the relationship between α and p and the effects of policy interventions in the remainder of this study. The threshold $\hat{\lambda}$ measures the change in the aggregate demand due to a change in the domestic content share at the extensive margin, corresponding to viewers' decisions on whether or not to subscribe, whereas $\hat{\hat{\lambda}}$ measures the change in the demand at the intensive margin, corresponding to changes in the demand of existing subscribers. We call viewers being *strongly home-biased* (*strongly foreign-biased*) when they are both first-order and second-order home-biased (foreign-biased). We call them being *home-biased* when they are first-order but not second-order home-biased; analogously, we use a similar logic for the foreign-biased case.

We are yet agnostic regarding which one of $\hat{\lambda}$ and $\hat{\hat{\lambda}}$ is larger, but several possible cases emerge:

(i) if $\frac{\lambda}{1-\lambda} > max\{\hat{\lambda}, \hat{\hat{\lambda}}\}$, viewers are *strongly home-biased*;

(ii) if $\frac{\lambda}{1-\lambda} < min\{\hat{\lambda}, \hat{\hat{\lambda}}\}$, viewers are *strongly foreign-biased*;

(iii) if $\hat{\lambda} < \frac{\lambda}{1-\lambda} < \hat{\hat{\lambda}}$, viewers are first-order home-biased and second-order foreign-biased, which we refer to as viewers being *home-biased*;

(iv) if $\hat{\hat{\lambda}} < \frac{\lambda}{1-\lambda} < \hat{\lambda}$, viewers are first-order foreign-biased and second-order home-biased, which we refer to as viewers being *foreign-biased*.

In either case, we may need to find out the relative magnitude of the changes in demand at the extensive and intensive margins.

Examining the platform's first-order conditions, we conclude how a change in the content composition affects the subscription fee as established in Proposition 1 below.

Proposition 1 *An increase in the share of domestic content featured by the streaming platform increases the subscription fee if viewers are strongly home-biased, and it decreases the subscription fee if viewers are strongly foreign-biased.*

The proof of the proposition is available in Appendix A. The reason for this relationship is as follows. An increase in the share of domestic content benefits domestic captives but harms foreign captives, and vice versa. A decision in the interest of one group of viewers incentivises the platform to raise the subscription fee if the share of viewers in that group is sufficiently large, so the platform exploits the dominant viewers' group; this is more likely to occur if the bias of the dominant group is strong enough. In contrast, if, for some reason, the platform must make a decision against the interest of the dominant viewers, the platform would lower the subscription fee as a strategy to compensate them for not being able to access as much of their favourite content. From the platform's perspective, this lower subscription fee can be seen as an attempt to prevent it from losing demand from the larger market segment altogether. Note that the above conditions are sufficient rather than necessary.

Denote the solution to the platform's problem in the baseline model as the optimal pair characterised by $p^* = p(\lambda)$ and $\alpha^* = \alpha(\lambda)$. With this optimal share of domestic content and subscription fee, the equilibrium aggregate demand is given by $x^* = x(\alpha^*, p^*)$, and the domestic consumer surplus under the laissez-faire equilibrium is given by[8]:

$$CS^* = CS(\alpha^*, p^*) = \lambda U^d(\alpha^*, p^*) + (1-\lambda)U^f(\alpha^*, p^*) \tag{5}$$

In Section 4, we show how each of the policy interventions considered affects each of the outcomes above: the optimal share of domestic content and the subscription fee chosen by the platform, as well as the domestic consumer surplus. Based on the analysis in this section, we expect each policy intervention to affect consumer surplus through its effects on content composition and the subscription fee. In other words, the total effects of each policy intervention on consumer welfare are two-fold: the *content effect*, which materialises through the change in the share of featured domestic content, and the *price effect*, which materialises through how the change in the content share affects the subscription fee as established in Proposition 1.

[8]Note that in all regimes, consumer surplus can always be expressed in terms of market demand as follows. From the total market demand $x(\alpha(p), p)$, we can obtain the inverse demand function $p(x) = x^{-1}(x)$, giving total consumer surplus in the equilibrium of a particular regime, $CS(x) = \int_0^{x_0} [\bar{p} - p(x)]dx$, where x_0 is the market demand in equilibrium in the corresponding regime, and $\bar{p} = p(0)$ is viewers' maximum willingness to pay.

Ideally, the effect of an instrument should be measured by its implications on overall domestic social welfare, which, in this case, consists of domestic consumer surplus, the domestic content producer's profit, and the domestic government's revenue from the policy, where applicable. However, since the major concern associated with foreign dominance, at least the one that motivates this study, is the erosion of domestic culture rather than its economic consequences, is it reasonable to focus on investigating how each policy affects domestic captives instead of the whole economy to devise appropriate policy recommendations accordingly. Moreover, we avoid treating such policies as an income-generating instrument for the domestic government, especially under the tariff regime, which is against the initial purpose of the instruments to promote local content and preserve domestic culture. We nevertheless analyse in the extension how the results obtained under this welfare measure change when we take the domestic producer's interest into account, so that the domestic social welfare is a weighted sum of the consumer surplus and the domestic content producer's profit.

3 First-Best Content Composition

Before investigating the effects of each policy intervention, we first analyse the conditions that motivate the regulations. Assume the objective is to maximise consumer surplus (viewers' surplus). Then, the first-best solution for the share of domestic content would be identified as follows:[9]:

$$\alpha^{FB} = \arg\max_{\alpha} \left\{ \int_0^{p(\alpha)} x(\alpha, p)dp - p(\alpha)x(\alpha, p(\alpha)) \right\}$$
$$\text{s.t. } \Pi(\alpha, p(\alpha)) \geq 0, \text{ and}$$
$$p(\alpha) = -\frac{x(\alpha, p(\alpha))}{x_p(\alpha, p(\alpha))} \tag{6}$$

Superscript FB refers to first-best outcomes. The associated subscription fee chosen by the platform is given by $p(\alpha^{FB}) = p^{FB}$. Solving the domestic government's problem above, we obtain the following proposition.

Proposition 2 *The foreign streaming platform hosts less than the first-best share of domestic content if either:*

(i) Viewers are home-biased, or

(ii) Viewers are strongly home-biased, but the effect of content composition on demand at the extensive margin is larger than at the intensive margin.

[9]This consumer surplus maximisation problem is a special case, which could serve as a benchmark for the best-case scenario, where the society in the domestic country could extract the whole surplus from the streaming platform, and breaking-even is enough for the platform to continue its operation. This might not be the case if the platform has a strong position to require a positive profit to continue providing services in the domestic country.

Proof of the proposition is available in Appendix B. The finding above is intuitive. The first-best would be to choose a domestic content share where consumer surplus is the highest and the platform keeps operating in the country. Recall from Proposition 1 that strong home bias leads to an increase in the subscription fee, weighing the consumer surplus down. If the second-order home bias becomes too large, where an increase in α makes the demand from domestic captives become very inelastic, the platform may exploit them through the subscription fee. Hence, an increase in the domestic content share enhances consumer surplus if viewers are home-biased, but should not be excessively home-biased. The platform optimises its profit regardless of viewers' composition, and with this viewers' condition, the platform's choice of domestic content share is lower than the level that society would have chosen.

The first-best objective is to maximise consumer welfare, which can still be attained even when the minority group stops participating altogether, so long as the interest of the majority group (dominant viewers) is served to the maximum. The platform, in contrast, aims to maximise its profit, which is achieved when everyone participates regardless of the viewers' composition, since all viewers pay the same subscription fee. When viewers are home-biased, the aim is to reach the highest attainable level of domestic content share in the interest of domestic captives without harming them through the anticipated increase in the subscription fee. In contrast, the platform's strategy is to decide on a content composition that would induce all viewers to subscribe. The finding, therefore, suggests that policy interventions are necessary when viewers, in general, have a reasonably high interest in domestic content, but the platform under-serves them.

4 Policy Interventions

4.1 Content Quota

Under the content quota regime, the foreign streaming platform faces a quota on foreign content to be streamed in the domestic country, such that the share of foreign content it hosts must be less than a certain threshold. Equivalently, under this regime, the platform is obliged to feature a minimum fraction of domestic content in its catalogue of content to be made available for streaming in the domestic country, so that the platform faces a quota constraint $\alpha \geq \underline{\alpha}$. In this case, the platform's problem is given by:

$$\underset{\alpha,p}{\text{Max}}\ \Pi = px(\alpha, p) - r(\alpha) \quad \text{s.t.}\ \ \alpha \geq \underline{\alpha} \tag{7}$$

Denote the solution to the platform's problem under the quota regime as characterised by $p^Q = p(\lambda)$ and $\alpha^Q = \alpha(\lambda)$, giving the associated equilibrium aggregate demand of $x^Q = x(\alpha^Q, p^Q)$. There are two sets of possible solutions to the platform's problem. First, if the quota constraint is inactive, that is, if the quota set by the government is lower than what the platform would have chosen in the absence of policy intervention, the outcome is the same as in the absence of intervention, that is, $\alpha^Q = \alpha^*$ and $p^Q = p(\alpha^*) = p^*$. Second, if the quota constraint is active, it is binding such that the platform chooses exactly the minimum threshold required by the quota, i.e., $\alpha^Q = \underline{\alpha} > \alpha^*$ and charges $p^Q = p(\underline{\alpha})$, given that such a solution exists, which then requires $\Pi(\underline{\alpha}, p(\underline{\alpha})) > 0$. The reason is that the

platform's profit is strictly concave in α and is maximised at α^*; therefore, any deviation from α^* is not profitable, but the quota forces the platform to raise α^* to $\underline{\alpha}$. In this case, the content quota raises the share of featured domestic content and, by Proposition 1, increases the subscription fee if viewers are strongly home-biased.

In summary, at this stage, the share of domestic content under the quota intervention is defined by $\alpha^Q = Max\{\alpha^*, \underline{\alpha}\}$. Either way, the domestic consumer welfare under the content quota is given by $CS^Q = CS(x^Q)$. When the quota constraint is active, we have consumer surplus $CS^Q = CS(\underline{\alpha}, p(\underline{\alpha}))$; otherwise, we have that under the baseline model, $CS^Q = CS(\alpha^*, p^*)$.

The government then chooses the value for $\underline{\alpha}$ as one that maximises consumer surplus, which, from the previous section, is given by α^{FB}. It, therefore, follows that the foreign streaming platform faces a binding quota constraint of $\alpha = \underline{\alpha} = \alpha^{FB} > \alpha^*$ if either one of the conditions in Proposition 2 holds, in which it chooses exactly $\alpha^Q = \underline{\alpha}$, yielding consumer surplus of $CS^Q = CS(\underline{\alpha}, p(\underline{\alpha}))$. Otherwise, the quota constraint is inactive, and the platform chooses $\alpha^Q = \alpha^*$, with the associated consumer surplus of $CS^Q = CS(\alpha^*, p^*)$.

From the analysis, we conclude that a content quota increases the share of featured domestic content if viewers are either home-biased or strongly home-biased, but the effect of the change in content composition on the demand at the extensive margin is larger than at the intensive margin. Note that in such cases, the increase in the domestic content share is also followed by an increase in the subscription fee. However, since by definition, α^{FB} maximises consumer surplus, whenever the content quota is binding, it always raises consumer welfare, meaning that the *content effect* of the policy dominates the *price effect*. Based on this, we have the following proposition.

Proposition 3 *The first-best content quota increases the share of domestic content featured by the foreign streaming platform and raises consumer surplus if either:*

(i) Viewers are home-biased, or

(ii) Viewers are strongly home-biased, but the effect of content composition on demand at the extensive margin is larger than at the intensive margin.

Otherwise, the outcome is the same as in the absence of intervention.

The reason for the increase in the domestic content share in a home-biased environment as a result of the content quota follows from the previous section. An increase in the share of domestic content benefits domestic captives and harms foreign captives. The overall content effect of the change in the content composition, therefore, depends on the share of viewers benefiting and losing from the change. A home-biased environment means that most viewers benefit from the increase in the share of featured domestic content as a result of the content quota, raising the overall consumer surplus. Note that in such a case, the increase in domestic content share due to the content quota is also followed by an increase in the subscription fee. Therefore, it is important that the home bias is not so strong as to exert upward pressure on the subscription fee. Strong home bias must, at least, be moderated by a large change in demand at the extensive margin relative to the intensive margin. Under either of the above conditions, the benefit that the dominant domestic captives gain dominates the associated price increase, rendering an improved overall consumer surplus, as stated in Proposition 3.

When, instead, there are more foreign captives relative to domestic captives, the platform's decision is unaffected by the content quota, so it chooses what it would have chosen in the absence of intervention. In such a foreign-biased environment, the first-best would require the streaming platform to feature less domestic content to meet the dominant foreign captives' interest, but the nature of the content quota would not allow such enforcement, so the maximum consumer surplus is not attainable.

4.2 Investment Obligation

We now explore the potential outcomes under an investment obligation. In practice, the investment obligation takes different forms across countries, from direct investment (co-production and rights acquisition) to a levy paid to the national film fund. We model one in which the platform contributes a share of its revenue made in the domestic country towards the production of domestic content and helps improve the domestic producer's efficiency, allowing the platform to procure domestic content at a lower cost, or equivalently, a higher content quality. On the one hand, the investment obligation acts as an expense to the platform since it takes away a fraction of the total revenue it makes in the domestic market. On the other hand, the expense gives an investment return in the form of a royalty reduction for domestic content, which increases with the investment amount.

Denote the share of the revenue contributed by the streaming platform as $\beta \in [0, 1]$. The efficiency improvement resulting from the platform's investment is defined by a function $f : [0, 1] \to [0, \Theta], \quad \beta \mapsto \theta = f(\beta)$, where $f(\beta)$ has a property $f' < 0$, so that the domestic producer's cost, hence, its content royalty, is decreasing in the platform's investment. This defines a function f that maps the investment obligation $\beta \in [0, 1]$ to domestic (in)efficiency $\theta \in [0, \Theta]$. Since a *lower* θ reflects *higher* domestic efficiency, the condition $f'(\beta) < 0$ indicates that greater investment obligations improve domestic efficiency. From now on, we refer to $f(\beta)$ as the domestic producer's 'efficiency improvement' and f' as the platform's 'investment return' for convenience.

The problem of the foreign streaming platform becomes[10]:

$$\underset{\alpha,p}{\text{Max}}\ \Pi = (1-\beta)px(\alpha, p) - \theta r^d(\alpha) - r^f(\alpha) \tag{8}$$

The solution to the platform's problem satisfies the following first-order conditions:

$$\Pi_p(\alpha, p) = \frac{d\Pi}{dp} = (1-\beta)[px_p(\alpha, p) + x(\alpha, p)] = 0 \tag{9.1}$$

$$\Pi_\alpha(\alpha, p) = \frac{d\Pi}{d\alpha} = (1-\beta)px_\alpha(\alpha, p) + (1-\theta)r_\alpha(\alpha) = 0 \tag{9.2}$$

Denote the solution to the platform's problem under the investment obligation regime as characterised by $p^I = p(\beta, \lambda)$ and $\alpha^I = \alpha(\beta, \lambda)$, yielding the equilibrium aggregate demand of $x^I = x(\alpha^I, p^I)$. Note that at $\beta = 0$, this solution is the same as in the baseline model.

Clearly, an investment is only reasonable if the gain (the reduced cost of acquiring domestic content) is greater than the associated cost (the forgone share of revenue to invest

[10]We intentionally expand the cost function under this regime to highlight the effect of the investment obligation on the domestic content production efficiency.

in domestic content). Moreover, in contrast to other interventions, under this regime, any decision that increases the total revenue does not translate proportionally into an increase in profit due to the requirement to invest part of it. An increase in the subscription fee, for example, when it increases the total revenue, also implies a higher share of forgone revenue and, hence, a higher investment cost for some given level of β. Meanwhile, the platform has no control over the investment return, leaving it to play out its pricing strategy. Noting that the investment cost is subtracted from the whole total revenue, whereas the royalty discount only applies to domestic content, in some cases, it may be reasonable for the platform to choose a content composition that is associated with a lower subscription fee to minimise its investment cost unless the investment return is high enough to justify the forgone revenue. This, to some extent, reflects the distortionary effect the investment obligation entails under certain circumstances.

We first perform comparative statics to obtain the effects of β on the subscription fee and the share of featured domestic content. The details of the analysis are provided in Appendix C. In summary, we have the following lemma.

Lemma 1 *An investment obligation on foreign content induces the foreign streaming platform to feature a higher share of domestic content under the following sufficient conditions:*

(i) Price elasticity of demand is elastic,

(ii) Viewers are strongly home-biased,

(iii) Investment return is sufficiently high, such that $|f'| > \frac{px_\alpha(\alpha^I, p^I)}{r^d_\alpha} \equiv \hat{f}'$.

Such a change in content composition is followed by an increase in the subscription fee.

Recalling from the baseline, the platform optimises its objective by choosing two interdependent strategic variables: content composition and subscription fee. Like other interventions, an investment obligation interferes with its strategic decision on the content composition, affecting its ability to exploit the subscription fee in maximising its profit. However, under this regime, its decision is also confounded by the gains and losses from the investment.

The fact that the strong home bias and high investment return induce the platform to feature a higher share of domestic content and charge a higher subscription fee is straightforward. The intuition that the demand must also be price-elastic is as follows. Ideally, firms would increase prices if the demand is price inelastic and decrease prices otherwise. However, the strong home bias situation allows the platform to charge a higher subscription fee despite the elastic demand due to the second-order home bias, where domestic captives' sensitivity to price decreases significantly when the platform increases the share of their preferred content. The platform can then exploit this second-order home bias to increase the subscription fee despite the elastic demand. When the demand is inelastic, although the platform can profitably increase the subscription fee, the marginal benefit of exploiting the domestic captives with an already inelastic demand is low. In other words, the investment obligation helps mitigate the negative effects of increasing the subscription fee when the demand is elastic, allowing the platform to continue charging a higher subscription fee to extract rents from the domestic captives.

Note, however, that the conditions in Lemma 1 are sufficient rather than necessary, so that similar outcomes can still be attained under other conditions. One case when an increase in the investment obligation leads to a decrease in the domestic content share is when the investment return is low, $|f'| < \hat{f}'$, the viewers are strongly foreign-biased, and the demand is price-elastic.

We proceed to the first stage to analyse the first-best scenario under an investment obligation. The domestic consumer welfare in a reduced form under the investment obligation regime is given by $CS^I = CS(x^I)$. Denote the optimal level of investment obligation, which maximises the consumer surplus as $\beta^* = \beta(\lambda)$. Examining the consumer surplus under this optimal investment obligation and comparing it to that under the baseline model, as explained in detail in Appendix C, we obtain the following proposition.

Proposition 4 *A slight increase from zero in the investment obligation on foreign content improves consumer surplus if:*

(i) Price elasticity of demand is elastic,

(ii) Viewers are strongly home-biased,

(iii) Investment return is sufficiently high, such that $|f'| > \hat{f}'$*,*

(iv) The content effect dominates the price effect.

Lemma 1 shows that conditions (i)-(iii) above lead to an increase in the share of domestic content, followed by an increase in the subscription fee. However, for viewers to benefit from the increase in the domestic content share, we would need them to gain more from the former than they lose from the latter, as stated in point (iv). The above conditions without (iv) would harm consumer welfare.

Condition (i) plays an important role in determining the welfare effect of the investment obligation: viewers must be flexible enough to reduce their demand, or to quit the market altogether if the platform charges a subscription fee that is too high due to the strong home-biased preferences of consumers; otherwise, the platform exploits their participation through elevated subscription fees, and the policy ultimately harms consumers. Therefore, mandating the platform to invest in domestic content production is only reasonable if viewers, in general, have a strong preference for domestic content and their valuation of domestic content is high enough to offset the disutility arising from the increase in the subscription fee following the increase in domestic content share. However, it is also necessary that their demand is elastic enough to prevent the platform from charging excessive subscription fees and exploiting them.

In summary, our analysis reveals that the content quota and investment obligation have the potential to increase the share of domestic content featured by the foreign streaming platform, each affecting the way the streaming platform sets its optimal content composition and subscription fee in different ways. The increase in the domestic content share resulting from the interventions, however, does not always lead to higher consumer welfare, especially if viewers exhibit strong preferences for foreign content. As a policy implication, policymakers must, therefore, carefully evaluate and prioritise their objectives. If the primary goal is

to increase the share of domestic content, implementing the interventions above could be instrumental in achieving this aim. Conversely, if greater emphasis is placed on enhancing consumer welfare, those instruments may work if viewers are home-biased with reasonable demand sensitivity. In the context of TV broadcasting, Crampes and Hollander (2008) similarly show that content quotas intended to boost the production of specific types of programs may, ironically, lead to smaller audiences for those very shows and could lower the production of such content.

4.3 Tariff on Foreign Content

The analyses in the previous section demonstrate situations in which a policy instrument may induce the streaming platform to feature a higher share of domestic content, without necessarily improving domestic social welfare. In this subsection, we consider a tariff on foreign content as an alternative measure for comparison.[11] In the model, the tariff intervention takes the form of a duty applied to all foreign content featured in the catalogue of the streaming platform in the domestic country. Assume the tariff takes a function $t(\alpha, \tau)$, which is decreasing and convex in α and increasing in the tariff rate τ. The problem of the platform becomes:

$$\underset{\alpha,p}{\text{Max}}\ \Pi = px(\alpha, p) - r(\alpha) - t(\alpha, \tau) \tag{10}$$

The first-order conditions to the platform's problem under the tariff regime are similar to those under the baseline model, except that now we have a tariff in $\Pi_\alpha(\alpha, p)$ as follows:

$$\Pi_\alpha(\alpha, p) = px_\alpha(\alpha, p) + (1-\theta)r_\alpha(\alpha) - t_\alpha(\alpha, \tau) = 0 \tag{11}$$

so we also have a new $\Pi_{\alpha\alpha}$. Denote the solution to the platform's problem under the tariff regime as characterised by $p^T = p(\tau, \lambda)$ and $\alpha^T = \alpha(\tau, \lambda)$, with the equilibrium aggregate demand of $x^T = x(\alpha^T, p^T)$. Note that at $\tau = 0$, this solution is reduced to that under the baseline model. The effects of the tariff on the share of featured domestic content and the subscription fee are summarised in the following lemma.

Lemma 2 *An increase in tariffs on foreign content induces the foreign streaming platform to feature a higher share of domestic content. Moreover, the tariff leads to an increase in the subscription fee if viewers are strongly home-biased.*

The proof of the lemma above is provided in Appendix D. The fact that the tariff on foreign content increases the share of featured domestic content is obvious. Consistent with the complementarity of α and p in a (strong) home-biased environment established in Proposition 1 earlier, this increase in domestic content share in favour of domestic captives leads to an increase in the subscription fee when there is a sufficiently large share of domestic captives. When viewers are (strongly) foreign-biased, for the same reason as the platform

[11] A tariff on foreign movies is relevant to the recent action by the US government, which contemplates imposing a full tariff on movies produced outside the country, as a response to related policies by other countries.

does under the other regimes, by charging a lower subscription fee, it compensates the large foreign-captive segment for the lower share of foreign content available due to the tariff in order to avoid losing the demand from this large segment.

Now, we solve the first-best under a tariff regime and proceed to compare the outcomes to the laissez-faire equilibrium. Denote the reduced-form total consumer surplus under the tariff regime as $CS^T = CS(x^T)$. Solving the problem by maximising consumer surplus, we obtain the optimal tariff on foreign content denoted as $\tau^* = \tau(\lambda)$. Performing an analysis similar to the investment obligation regime, we can establish the following proposition on the welfare effect of a content tariff, the proof of which follows in Appendix D.

Proposition 5 *A slight increase from zero in the tariff on foreign content always improves consumer surplus when either:*

(i) Viewers are home-biased, or

(ii) Viewers are strongly home-biased, but the effect of content composition on demand at the extensive margin is larger than at the intensive margin.

Otherwise, a zero tariff is optimal.

Therefore, just like the investment obligation, a content tariff on foreign content is justifiable from a consumer welfare perspective if viewers value domestic content highly. The intuition for the implications of the content tariff on consumer welfare follows similarly from those under the other interventions. When viewers are home-biased, a huge portion of viewers benefit when the platform increases the share of featured domestic content in reaction to the increased relative price of foreign content due to the tariff. However, the home bias should not be too strong, as it may lead to excessive subscription fees being charged by the platform, weighing down consumer welfare.

Analogously, when viewers are foreign-biased, a large portion of viewers suffer when the platform reacts to the tariff by reducing the share of featured foreign content; the decrease in the subscription fee following the reduction of foreign content share is insufficient to make up for this loss, leading to lower overall consumer welfare. Jeon et al. (2021) study the implication of a tax on the foreign platform, which is equivalent to the content tariff discussed here, and obtain a result similar to ours: such an intervention may increase the surplus of domestic producers but would decrease consumer surplus, particularly if the market is on the verge of favouring the foreign platform without the tax.

5 Extension: Implications on Domestic Social Welfare

In this section, we account for the role of the domestic content producer in welfare maximisation. Consider an alternative welfare function as a weighted sum of the consumer surplus and the domestic producer's profit. Assume that the domestic producer's only source of revenue is the royalty on domestic content and that it does not incur any production costs, so its profit under the baseline model without policy intervention is given by $\Phi^* = \Phi(\alpha^*) = \theta r^d(\alpha^*)$,

which is strictly increasing and convex in α^*. With this setup, the domestic social welfare in the absence of intervention is given by:

$$W^* = \delta CS(x^*) + (1-\delta)\Phi(\alpha^*) \tag{12}$$

where $x^* = x(\alpha^*, p^*)$ is the aggregate demand under the baseline model, and $\delta \in [0,1]$ is the weight assigned to consumer surplus in the welfare maximisation, representing the importance placed on consumers relative to domestic producers.

A detailed analysis of including the domestic producer's profit in the domestic welfare maximisation is provided in Appendix E. With the domestic producer's profit in the picture, there is more reason to push the streaming platform to feature a higher share of domestic content. Consequently, Proposition 2 continues to hold with more relaxed conditions. Under this new welfare function, the first-best share of domestic content can be higher than the profit-maximising one not only when viewers are home-biased, as indicated in Proposition 2, but also when viewers are foreign-biased but greater importance is placed on the domestic producer's interest, as indicated by a lower δ.

Since the content quota is determined based on the first-best share of domestic content, the welfare effect of the content quota established in Proposition 3 also partly carries over even after the inclusion of the domestic producer's profit in the domestic welfare function. More specifically, the content quota can increase domestic social welfare if either viewers are home-biased, as mentioned in Proposition 3, or if viewers are foreign-biased but the domestic content producer has a more prominent role in the welfare maximisation.

The case with investment obligation is slightly more complex, but the intuition follows straightforwardly. When focusing only on consumer surplus, we establish in Proposition 4 that investment obligation mainly improves consumer welfare in a home-biased environment. When the domestic producer's interest is taken into account, improvement in overall domestic welfare is still possible even when viewers are foreign-biased if the domestic producer is prioritised in the welfare maximisation, that is when $\frac{\delta}{1-\delta} < \left| \frac{f(\beta) r_\alpha(\alpha^*) \frac{d\alpha}{d\beta} + f' r^d(\alpha^*)}{x_\alpha(\alpha^*, p^*) x_p(\alpha^*, p^*)} \right| \equiv \hat{\delta}_1$. As can be seen, the investment obligation is more likely to be welfare-enhancing when the efficiency improvement resulting from the investment, $f(\beta)$, is higher.

The welfare effect of a content tariff, when accounting for the domestic producer's profit in the domestic social welfare, also follows in a similarly analogous way. As demonstrated in Appendix E, a positive tariff on foreign content enhances domestic social welfare if viewers are home-biased, partly confirming Proposition 5. However, in this scenario, a tariff can also increase the overall domestic welfare when viewers are foreign-biased, but they have a relatively low weight compared to the domestic producer in the welfare maximisation, that is, $\frac{\delta}{1-\delta} < \left| \frac{\theta r_\alpha(\alpha^*) \frac{d\alpha}{d\tau}}{x_\alpha(\alpha^*, p^*) x_p(\alpha^*, p^*)} \right| \equiv \hat{\delta}_2$. Therefore, a content tariff can now enhance domestic social welfare, even if viewers are foreign-biased, when relatively less importance is placed on the consumer surplus.

The welfare effects of those policies when accounting for the domestic producer in the welfare maximisation are summarised by the following proposition.

Proposition 6 *A content quota, an investment obligation, and a tariff on foreign content enhance overall domestic social welfare, either when viewers are home-biased or when view-*

ers are foreign-biased, but a higher weight is assigned to domestic content production over consumer welfare.

Including the domestic producer's interest in the domestic welfare function optimally induces the streaming platform to feature a higher share of domestic content even more. This reinforces most of the findings established in the baseline model when domestic welfare is made up solely by consumer surplus. Considering the domestic content producer's interest in the domestic social welfare weighs down the potential negative effects of each of the policies, making them more likely to be welfare-enhancing, especially if a higher importance is put on boosting the domestic content industry rather than on consumer welfare.

Richardson (2006) also conducts similar welfare analysis by considering an externality attached to local content for a policymaker. The result shows that in the absence of any externality, the first-best is attainable under maximal differentiation between the stations, but the laissez-faire solution involves less than maximal differentiation, and a cultural quota further reduces that differentiation so that the quota, rather than helping achieve the first-best solution, brings the outcome further away from it. Moreover, Richardson (2006) demonstrates that a quota may raise consumer welfare but lower overall welfare by decreasing diversity, which, to some extent, is consistent with our finding.

6 Future Research

There are several ways through which these findings could be further confirmed or illustrated. The next step would be to use a specific demand function and assume a particular cost structure on the royalties to illustrate the effects of each policy intervention on our outcomes of interest: the share of featured domestic content, the subscription fee, and the domestic social welfare. For the investment obligation, it would also be useful to assign a certain function for $f(\beta)$. Applying these specific functions would also help disentangle the relationships between the assumed parameters. This approach could potentially yield more intuitive results, particularly in the context of the investment obligation.

The model can also be extended in several other directions. As mentioned earlier, modelling viewers' evolving preferences for content could be an interesting exercise for the study. Moreover, allowing the content royalties to be endogenously determined through bargaining between the streaming platform and the content producers could potentially result in new insights. Considering competing streaming platforms rather than a monopoly may also bring the model into a more realistic setup, as we disallow the platform to hold monopoly power and let the domestic content provider have alternative platforms to host their content.

One of the issues often discussed in the literature is the presence and the associated outcomes of economic unions, in which countries enter a formal agreement to promote commercial harmony by eliminating trade barriers and coordinating social and financial policies to support their common market. In the EU audiovisual context, however, member states remain fragmented in their media policies despite the recent directive measures from the EU, as most tend to focus on domestic over non-national European works. Therefore, the next avenue to explore as an extension of this study could be the role of economic unions in dealing with foreign giant platforms by featuring the model with multiple countries in a union and allowing interventions to be adopted unilaterally as well as harmoniously.

European countries differ in geographical and market sizes, depending on how widely a language is spoken, cultural landscapes, and consumers' preferences for local content. As a result, they benefit differently from the measures prescribed by the EU. In particular, the policies seem to benefit larger markets only, reinforcing imbalances between small and large countries. The extension of this study could unravel the rationale behind the discrepancies and find ways in which smaller markets can benefit equally from the policies. To address this matter, it would be necessary to develop a model of multiple countries differing in size, which could be interpreted as differences in population or language advantage. Ultimately, the model would seek to provide insights into balancing the interests of different market sizes and the necessity of protective measures in the evolving digital economy.

It is widely known that protectionism is often associated with lower innovations, which, in this case, could occur if domestic producers react to the quota restrictions by choosing a lower level of content quality, leading to deteriorating domestic social welfare. It is thought-provoking to examine the effects of those policies on domestic content quality, which, in turn, could affect consumers' decisions initially associated with exogenous preferences. On the one hand, protectionism may encourage inefficient firms to stay in business and induce less scope for specialisation, innovation, and economies of scale. On the other hand, a better position might encourage local content producers to compete more aggressively, knowing that they have government support. The only way to obtain an early, bigger picture of which scenario may prevail is through a model developed featuring content quality.

Finally, in light of the claim that the measures only spur content production but not content distribution, comparing the relative effectiveness of those interventions in terms of local content exposure would be interesting. In this matter, in addition to content production, there is a need to model content distribution, which could be measured by, for example, domestic and international viewership of domestic content. This modelling would also help determine whether the interventions help to preserve local culture as intended.

7 Conclusion

We examine the implications of content quotas and investment obligations in the audiovisual market. Featuring a foreign streaming platform, we demonstrate that the effects of each of the policy interventions on the share of domestic content featured by the streaming platform, the subscription fee, and the consumer surplus depend on viewers' preferences over domestic and foreign content. We show that each policy can increase the share of featured domestic content in different ways, but this increase in domestic content is not always associated with higher consumer welfare. Policies only increase consumer surplus if viewers, in general, prefer domestic over foreign content. This home bias should not be so strong that it induces the streaming platform to exploit the majority of consumers through excessive subscription fees.

The study also considers a tariff on foreign content as an alternative and shows that a content tariff generates welfare effects similar to those of other interventions. An extension of the model accounts for the domestic content producer's payoff in domestic welfare maximisation. It reveals that those policies can still increase the overall domestic social welfare even if viewers have strong preferences for foreign content when a higher weight is assigned to domestic content production than to consumer welfare. These findings suggest that gov-

ernments seeking to regulate their audiovisual markets need to decide on their objectives, either to prioritise increasing the share of domestic content or to enhance consumer surplus.

While providing important economic insights into the policy adoptions, this study is also subject to several limitations. Among them is that we assume there are only two groups of viewers, domestic captives and foreign captives, when in reality, there might be a subset of viewers who favour both domestic and foreign content. Moreover, we assume that consumers' preferences for content are fixed and that their assignment into either of the two groups is exogenous. In reality, viewers may shift between these groups as their preferences change due to persistent exposure to certain types of content. Accounting for this possibility may alter the results derived in this study and shed new light on the policy implications, allowing governments to adjust their strategies accordingly. As previously mentioned, we leave this alternative modelling to future research.

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Appendices

A Content Composition and Subscription Fee

Assumption 4 implies:

$$\begin{aligned}
\Pi_\alpha(\alpha,p) = px_\alpha(\alpha,p) + (1-\theta)r_\alpha(\alpha) \geq 0 \\
\Pi_p(\alpha,p) = px_p(\alpha,p) + x(\alpha,p) \geq 0 \\
\Pi_{\alpha\alpha}(\alpha,p) = px_{\alpha\alpha}(\alpha,p) + (1-\theta)r_{\alpha\alpha}(\alpha) < 0 \\
\Pi_{pp}(\alpha,p) = 2x_p(\alpha,p) + px_{pp}(\alpha,p) < 0 \\
\Pi_{\alpha\alpha}\Pi_{pp} - \Pi_{\alpha p}\Pi_{p\alpha} > 0 \\
\Pi_{\alpha\alpha}\Pi_{pp} - [x_\alpha(\alpha,p) + px_{\alpha p}(\alpha,p)][x_\alpha(\alpha,p) + px_{p\alpha}(\alpha,p)] > 0
\end{aligned}$$

Rearranging $\Pi_p(\alpha,p) = 0$, we have $p = -\frac{x(\alpha,p)}{x_p(\alpha,p)}$. Taking a partial derivative of p with respect to α, we have:

$$\begin{aligned}
\frac{\partial p}{\partial \alpha} &= -\frac{1}{x_p(\alpha,p)^2}\Big\{\frac{dx(\alpha,p)}{d\alpha}x_p(\alpha,p) - \frac{dx_p(\alpha,p)}{d\alpha}x(\alpha,p)\Big\} \\
&= -\frac{1}{x_p(\alpha,p)^2}\Big\{\Big[\frac{\partial x(.)}{\partial \alpha} + \frac{\partial x(.)}{\partial p}\frac{\partial p}{\partial \alpha}\Big]x_p(\alpha,p) - \Big[\frac{\partial x_p(.)}{\partial \alpha} + \frac{\partial x_p(.)}{\partial p}\frac{\partial p}{\partial \alpha}\Big]x(\alpha,p)\Big\} \\
&= -\frac{1}{x_p(\alpha,p)^2}\Big\{\Big[x_\alpha(\alpha,p) + x_p(\alpha,p)\frac{\partial p}{\partial \alpha}\Big]x_p(\alpha,p) - \Big[x_{p\alpha}(\alpha,p) + x_{pp}(\alpha,p)\frac{\partial p}{\partial \alpha}\Big]x(\alpha,p)\Big\} \\
\frac{\partial p}{\partial \alpha} &= \frac{[x_{p\alpha}(\alpha,p)x(\alpha,p) - x_\alpha(\alpha,p)x_p(\alpha,p)]}{2x_p(\alpha,p)^2 - x_{pp}(\alpha,p)x(\alpha,p)}
\end{aligned}$$

Assume that x_{pp} is negligibly low so the demand is not too convex, such that the following assumption holds.

Assumption 5 $2x_p(\alpha,p)^2 - x_{pp}(\alpha,p)x(\alpha,p) > 0$.

We can now focus on the numerator in deciding the sign of $\frac{\partial p}{\partial \alpha}$.

Denote $\epsilon = \frac{\partial x}{\partial p}\frac{p}{x}$ as the price elasticity of demand, and $\epsilon_\alpha = \frac{\partial \epsilon}{\partial \alpha}$ as the 'content elasticity of price elasticity', or 'elasticity sensitivity to content'. Note that $\epsilon_\alpha = \frac{p}{x^2}[x_{p\alpha}(\alpha,p)x(\alpha,p) - x_\alpha(\alpha,p)x_p(\alpha,p)] > 0$ if $x_{p\alpha}(\alpha,p)x(\alpha,p) - x_\alpha(\alpha,p)x_p(\alpha,p) > 0$. We can express the relationship between α and p as follows:

$$\frac{\partial p}{\partial \alpha} = \frac{\epsilon_\alpha x^2}{p[2x_p(\alpha,p)^2 - x_{pp}(\alpha,p)x(\alpha,p)]} > 0 \text{ if } \epsilon_\alpha > 0$$

Recalling $x_p(\alpha,p) < 0$, the sign of $\frac{\partial p}{\partial \alpha}$ is positive if either: (i) $x_\alpha(\alpha,p) > 0$ and $x_{p\alpha}(\alpha,p) > 0$ (accordingly, $\frac{\lambda}{1-\lambda} > max\{\hat{\lambda}, \hat{\hat{\lambda}}\}$), i.e., viewers are strongly home-biased; or (ii) $x_\alpha(\alpha,p) > 0$ and $x_{p\alpha}(\alpha,p) < 0$ (accordingly, $\hat{\lambda} < \frac{\lambda}{1-\lambda} < \hat{\hat{\lambda}}$), i.e., viewers are home-biased, but the change in demand at the extensive margin is larger than at the intensive margin, that is,

$|x_\alpha(\alpha,p)x_p(\alpha,p)| > |x_{p\alpha}(\alpha,p)x(\alpha,p)|$; or (iii) $x_\alpha(\alpha,p) < 0$ and $x_{p\alpha}(\alpha,p) > 0$ (accordingly, $\hat{\hat{\lambda}} < \frac{\lambda}{1-\lambda} < \hat{\lambda}$), i.e., viewers are foreign-biased, but the change in demand at the intensive margin is larger than at the extensive margin, that is, $x_{p\alpha}(\alpha,p)x(\alpha,p) > x_\alpha(\alpha,p)x_p(\alpha,p)$. Since the first condition is stronger than the second and the third, it constitutes the sufficient condition to establish Proposition 1, whereas the second and the third are necessary. The case for foreign-biased viewers mirrors that for home-biased viewers.

B First-Best vs. Profit-Maximising Content Composition

The solution to the domestic social planner's Lagrangian problem satisfies the following first-order condition:

$$\frac{dCS}{d\alpha} + \mu\frac{d\Pi}{d\alpha} = 0 \tag{13}$$

as well as the complementary slackness condition $\mu\Pi(\alpha^{FB}, p(\alpha^{FB})) = 0$, where $\mu \geq 0$ is a Lagrangian multiplier.

Denote the first term on (13) as $CS_\alpha(\alpha^{FB})$, which could be solved using the Leibniz rule as follows:

$$\frac{dCS}{d\alpha} = \int_0^{p(\alpha)} \frac{\partial x(\alpha,p)}{\partial\alpha}dp + x(\alpha,p(\alpha))\frac{\partial p}{\partial\alpha} - \frac{\partial p}{\partial\alpha}x(\alpha,p(\alpha)) - p(\alpha)\Big[\frac{\partial x(.)}{\partial\alpha} + \frac{\partial x(.)}{\partial p}\frac{\partial p}{\partial\alpha}\Big]$$

The two terms in the middle cancel each other out, so we have the remaining:

$$\frac{dCS}{d\alpha} = \int_0^{p(\alpha)} \frac{\partial x(\alpha,p)}{\partial\alpha}dp - p(\alpha)\frac{\partial x(.)}{\partial\alpha} - p(\alpha)\frac{\partial x(.)}{\partial p}\frac{\partial p}{\partial\alpha} \tag{14}$$

If viewers are first-order home-biased, the last term is positive, and the second term is negative. If x_α is increasing in p ($x_{\alpha p} > 0$, i.e., viewers are also second-order home-biased), the first term is highest at $p = p(\alpha)$ and lowest at $p = 0$, so the second term picks out the highest value of the first term, making the sum of the two terms negative. This implies that second-order home bias weighs down the increase in the consumer surplus resulting from an increase in the domestic content share. For $CS_\alpha(\alpha^{FB})$ to be positive, we need viewers to be first-order home-biased, but should not be second-order home-biased, where an increase in α makes their demand become very inelastic, in which case, the platform may exploit them. In case they are strongly home-biased, the magnitude of the change in their demand due to their demand sensitivity at the extensive margin must be larger than at the intensive margin, such that the last term of (14) dominates the first two terms. In the special case of linear demand (no second-order bias), the first two terms cancel each other, and the sign of $CS_\alpha(\alpha^{FB})$ only depends on the last term as follows:

$$CS_\alpha(\alpha^{FB}) = -p(\alpha^{FB})x_p(\alpha^{FB}, p(\alpha^{FB}))\frac{\partial p}{\partial\alpha} \gtreqless 0 \text{ if } \frac{\lambda}{1-\lambda} \gtreqless \hat{\lambda} \tag{15}$$

Excluding the Lagrangian multiplier, the second term on (13) is given by:

$$\frac{d\Pi}{d\alpha} = \underbrace{\frac{\partial \Pi}{\partial p}\frac{\partial p}{\partial \alpha}}_{\Pi_p=0} + \frac{\partial \Pi}{\partial \alpha} = \Pi_\alpha(\alpha^{FB})$$

Note that the first term is zero by the platform's first-order condition.

Given that the Lagrangian constraint is active, that is, $\mu > 0$, if viewers are home-biased such that $CS_\alpha(\alpha^{FB}) > 0$, the Lagrangian first-order condition requires that the consumer-welfare maximising share of domestic content satisfies $\Pi_\alpha(\alpha^{FB}) < 0$, so that α^{FB} lies in the decreasing part of $\Pi(\alpha)$. Recall that the profit-maximising share of domestic content satisfies $\Pi_\alpha(\alpha^*) = 0$. Since, by assumption, $\Pi(\alpha)$ is strictly concave is α, we can, therefore, conclude that $\alpha^* < \alpha^{FB}$ if $CS_\alpha(\alpha^{FB}) > 0$. This gives us Proposition 2.

C Effects of Investment Obligation

Totally differentiating the first-order conditions of the platform's profit maximisation problem under the investment obligation with respect to β, we have:

$$\frac{d\Pi_p(\alpha,p)}{d\beta} = \frac{\partial \Pi_p}{\partial p}\frac{dp}{d\beta} + \frac{\partial \Pi_p}{\partial \alpha}\frac{d\alpha}{d\beta} + \frac{\partial \Pi_p}{\partial \beta} = 0 \tag{16.1}$$

$$\frac{d\Pi_\alpha(\alpha,p)}{d\beta} = \frac{\partial \Pi_\alpha}{\partial p}\frac{dp}{d\beta} + \frac{\partial \Pi_\alpha}{\partial \alpha}\frac{d\alpha}{d\beta} + \frac{\partial \Pi_\alpha}{\partial \beta} = 0 \tag{16.2}$$

Writing them in matrix form, we have:

$$\begin{bmatrix} \Pi_{pp} & \Pi_{p\alpha} \\ \Pi_{\alpha p} & \Pi_{\alpha\alpha} \end{bmatrix} \begin{bmatrix} \frac{dp}{d\beta} \\ \frac{d\alpha}{d\beta} \end{bmatrix} = - \begin{bmatrix} \frac{\partial \Pi_p}{\partial \beta} \\ \frac{\partial \Pi_\alpha}{\partial \beta} \end{bmatrix}$$

Denote $D_I = \Pi_{\alpha\alpha}\Pi_{pp} - \Pi_{\alpha p}\Pi_{p\alpha} > 0$ with the associated values under the investment obligation regime. Using Cramer's rule, we obtain:

$$\frac{dp}{d\beta} = \frac{1}{D_I}\left\{ -\frac{\partial \Pi_p}{\partial \beta}\Pi_{\alpha\alpha} - \Pi_{p\alpha}\left(-\frac{\partial \Pi_\alpha}{\partial \beta}\right)\right\} = \frac{1}{D_I}\left\{ \frac{\partial \Pi_\alpha}{\partial \beta}\Pi_{p\alpha} - \frac{\partial \Pi_p}{\partial \beta}\Pi_{\alpha\alpha}\right\} \tag{17.1}$$

$$\frac{d\alpha}{d\beta} = \frac{1}{D_I}\left\{ \Pi_{pp}\left(-\frac{\partial \Pi_\alpha}{\partial \beta}\right) - \left(-\frac{\partial \Pi_p}{\partial \beta}\right)\Pi_{\alpha p}\right\} = \frac{1}{D_I}\left\{ \frac{\partial \Pi_p}{\partial \beta}\Pi_{\alpha p} - \frac{\partial \Pi_\alpha}{\partial \beta}\Pi_{pp}\right\} \tag{17.2}$$

As demonstrated above, the effects of an increase in the investment obligation on the share of featured domestic content and the subscription fee materialise through its effects on the platform's marginal profit, both with respect to the share of featured domestic content, $\frac{\partial \Pi_\alpha}{\partial \beta}$, and with respect to the subscription fee, $\frac{\partial \Pi_p}{\partial \beta}$. These effects are amplified or mitigated by the complementarity or substitutability between α and p captured by $\Pi_{\alpha p}$ and $\Pi_{p\alpha}$.

Note the following:

$$\frac{\partial \Pi_\alpha}{\partial \beta} = -[px_\alpha(\alpha^I, p^I) + f' r_\alpha(\alpha^I)] > 0 \text{ if } |f'| > \frac{px_\alpha(\alpha^I, p^I)}{r_\alpha^d} \equiv \hat{f}'$$

$$\frac{\partial \Pi_p}{\partial \beta} = -[px_p(\alpha^I, p^I) + x(\alpha^I, p^I)] = -(1+\epsilon)x(\alpha^I, p^I) > 0 \text{ if } |\epsilon| > 1$$

The effects of the investment obligation β on the share of featured domestic content and the subscription fee are then given by:

$$\frac{d\alpha}{d\beta} = \frac{1}{D^I}\Bigg\{ \underbrace{-(1-\beta)(1+\epsilon)x(\alpha^I,p^I)[x_\alpha(\alpha^I,p^I)+px_{\alpha p}(\alpha^I,p^I)]}_{(+)\text{ if strongly home-biased and } |\epsilon|>1} + \underbrace{[px_\alpha(\alpha^I,p^I)+f'r_\alpha(\alpha^I)]\Pi_{pp}}_{(+)\text{ if first-order home-biased and } |f'|>\hat{f}'} \Bigg\}$$

$$\frac{dp}{d\beta} = \frac{1}{D^I}\Bigg\{ \underbrace{(1+\epsilon)x(\alpha^I,p^I)\Pi_{\alpha\alpha}}_{(+)\text{ if } |\epsilon|>1} \underbrace{-(1-\beta)[px_\alpha(\alpha^I,p^I)+f'r_\alpha(\alpha^I)][x_\alpha(\alpha^I,p^I)+px_{p\alpha}(\alpha^I,p^I)]}_{(+)\text{ if strongly home-biased and } |f'|>\hat{f}'} \Bigg\}$$

Hence, we have Lemma 1.

The optimal investment obligation maximising the domestic consumer surplus satisfies the following first-order condition:

$$\frac{dCS^I}{d\beta} = \frac{\partial CS^I}{\partial x^I}\Big[\frac{\partial x^I}{\partial \alpha^I}\frac{d\alpha^I}{d\beta} + \frac{\partial x^I}{\partial p^I}\frac{dp^I}{d\beta}\Big] = 0 \tag{20}$$

Evaluating the first-order condition at $\beta = 0$, at which we have $\alpha^I = \alpha^*$ and $p^I = p^*$, we obtain:

$$\left.\frac{dCS^I}{d\beta}\right|_{\beta=0} = \frac{\partial CS^I}{\partial x}\Big[x_\alpha(\alpha^*,p^*)\frac{d\alpha}{d\beta} + x_p(\alpha^*,p^*)\frac{dp}{d\beta}\Big]$$

The above is positive under the conditions in Lemma 1, and if $x_\alpha(\alpha^*,p^*)\frac{d\alpha}{d\beta} > \left|x_p(\alpha^*,p^*)\frac{dp}{d\beta}\right|$, that is, if the *content effect* dominates the *price effect*. Therefore, we have Proposition 4.

D Effects of Content Tariff

Similar to the procedure under the investment obligation, we perform comparative statics to investigate the effects of the content tariff by totally differentiating the platform's first-order conditions with respect to τ as follows:

$$\frac{d\Pi_p(\alpha,p)}{d\tau} = \frac{\partial \Pi_p}{\partial p}\frac{dp}{d\tau} + \frac{\partial \Pi_p}{\partial \alpha}\frac{d\alpha}{d\tau} + \frac{\partial \Pi_p}{\partial \tau} = 0 \tag{21.1}$$

$$\frac{d\Pi_\alpha(\alpha,p)}{d\tau} = \frac{\partial \Pi_\alpha}{\partial p}\frac{dp}{d\tau} + \frac{\partial \Pi_\alpha}{\partial \alpha}\frac{d\alpha}{d\tau} + \frac{\partial \Pi_\alpha}{\partial \tau} = 0 \tag{21.2}$$

The system above can be presented in a matrix form as follows:

$$\begin{bmatrix} \Pi_{pp} & \Pi_{p\alpha} \\ \Pi_{\alpha p} & \Pi_{\alpha\alpha} \end{bmatrix}\begin{bmatrix} \frac{dp}{d\tau} \\ \frac{d\alpha}{d\tau} \end{bmatrix} = -\begin{bmatrix} \frac{\partial \Pi_p}{\partial \tau} \\ \frac{\partial \Pi_\alpha}{\partial \tau} \end{bmatrix} = \begin{bmatrix} 0 \\ -\frac{\partial \Pi_\alpha}{\partial \tau} \end{bmatrix}$$

Denoting $D_T = \Pi_{\alpha\alpha}\Pi_{pp} - \Pi_{\alpha p}\Pi_{p\alpha} > 0$ with the associated values under the tariff regime, we can obtain the effects of the content tariff on the subscription fee and the share of featured domestic content using Cramer's rule as follows:

$$\frac{dp}{d\tau} = \frac{1}{D_T}\Bigg\{ -\frac{\partial \Pi_p}{\partial \tau}\Pi_{\alpha\alpha} - \Pi_{p\alpha}\Big(-\frac{\partial \Pi_\alpha}{\partial \tau}\Big)\Bigg\} = \frac{\Pi_{p\alpha}}{D_T}\frac{\partial \Pi_\alpha}{\partial \tau} \tag{22.1}$$

$$\frac{d\alpha}{d\tau} = \frac{1}{D_T}\Bigg\{\Pi_{pp}\Big(-\frac{\partial \Pi_\alpha}{\partial \tau}\Big) - \Big(-\frac{\partial \Pi_p}{\partial \tau}\Big)\Pi_{\alpha p}\Bigg\} = -\frac{\Pi_{pp}}{D_T}\frac{\partial \Pi_\alpha}{\partial \tau} \tag{22.2}$$

For any $t(\alpha,\tau)$ such that $\frac{\partial \Pi_\alpha}{\partial \tau} > 0$, for example, $t(\alpha,\tau) = \tau(1-\alpha)$ or $t(\alpha,\tau) = \frac{1}{2}\tau^2(1-\alpha)$, we have $\frac{d\alpha}{d\tau} > 0$, so that an increase in the tariff on foreign content induces the platform to feature a higher share of domestic content, as expected. This is followed by an increase in the subscription fee if $\Pi_{p\alpha} > 0$, that is, if viewers are strongly home-biased. Therefore, we have Lemma 2.

It is then optimal to choose the tariff on foreign content to maximise the consumer surplus $CS^T = CS(x^T)$. The optimal tariff satisfies the following first-order condition:

$$\frac{dCS^T}{d\tau} = \frac{\partial CS^T}{\partial x^T}\Big[\frac{\partial x^T}{\partial \alpha^T}\frac{d\alpha^T}{d\tau} + \frac{\partial x^T}{\partial p^T}\frac{dp^T}{d\tau}\Big] = 0 \tag{23}$$

Evaluating the first-order condition at $\tau = 0$, at which we have $\alpha^T = \alpha^*$ and $p^T = p^*$, and making use of (22), we have:

$$\left.\frac{dCS^T}{d\tau}\right|_{\tau=0} = p[x_p(\alpha^*,p^*)x_{p\alpha}(\alpha^*,p^*) - x_\alpha(\alpha^*,p^*)x_{pp}(\alpha^*,p^*)] - x_\alpha(\alpha^*,p^*)x_p(\alpha^*,p^*)$$

Assuming that the demand is not too convex, so that x_{pp} is negligibly low, the above is positive under either of the conditions in Proposition 2. The same conditions then define the welfare effect of the content tariff: A departure from a zero tariff always improves consumer surplus if viewers are either home-biased or strongly home-biased, but the effect of content composition on demand at the extensive margin is larger than at the intensive margin, so the last term in (24) dominates the first. This leads to Proposition 5.

E Alternative Welfare Function

With the domestic welfare function as a weighted sum of the consumer surplus and the domestic producer's profit, $W = \delta CS(x(\alpha,p)) + (1-\delta)\Phi(\alpha)$, where $\Phi(\alpha) = \theta r^d(\alpha)$, the welfare-maximising share of domestic content is given by:

$$\alpha^{FB} = \arg\max_\alpha \left\{\delta\left[\int_0^{p(\alpha)} x(\alpha,p)dp - p(\alpha)x(\alpha,p(\alpha))\right] + (1-\delta)\Phi(\alpha)\right\}$$
$$\text{s.t. } \Pi(\alpha,p(\alpha)) \geq 0, \text{ and}$$
$$p(\alpha) = -\frac{x(\alpha,p(\alpha))}{x_p} \tag{24}$$

Under this new setup, the solution to the Lagrangian problem satisfies the following first-order condition:

$$\delta\frac{dCS}{d\alpha} + (1-\delta)\frac{\partial\Phi}{\partial\alpha} + \mu\frac{d\Pi}{d\alpha} = \delta CS_\alpha(\alpha^{FB}) + (1-\delta)\Phi_\alpha(\alpha^{FB}) + \mu\Pi_\alpha(\alpha^{FB}) = 0 \tag{25}$$

where $\Phi_\alpha(\alpha^{FB}) = \theta r_\alpha(\alpha^{FB}) > 0$. Recalling (15), the first term of the expression above is positive under either of the home-biased conditions in Proposition 2. With the second term also being positive, the third term must be negative, so that as α^{FB} lies in the decreasing

part of $\Pi(\alpha)$, and hence, is larger than α^* under either of the conditions in Proposition 2. Note, however, in this case, $\alpha^{FB} > \alpha^*$ can still hold in a foreign-biased environment if δ is sufficiently low such that the positive second term in expression (25) offsets the negative first and third terms. Therefore, the share of domestic content desirable to the domestic planner could still be higher than the profit-maximising one in a foreign-biased environment if a very high relative importance is placed on the domestic producer's interest.

It follows that the quota constraint is active and binding, inducing the streaming platform to host a higher share of domestic content and is welfare-improving under the same conditions. Hence, our result regarding the welfare effect of the content quota established in Proposition 3 continues to hold even after including the domestic producer's profit in the domestic welfare maximisation problem, but with more relaxed conditions: a content quota can still yield a higher overall domestic welfare even when viewers are foreign-biased if the domestic government prioritises the domestic producer's welfare over consumer welfare. Including the domestic producer's profit in the welfare maximisation, therefore, relaxes the conditions required for the content quota to be welfare-enhancing.

With this new welfare function, the domestic social welfare under the investment obligation regime in a reduced form is given by $W^I = \delta CS(x^I) + (1-\delta)\Phi(\alpha^I)$, where $x^I = x(\alpha^I, p^I)$, and $\Phi(\alpha^I) = f(\beta) r^d(\alpha^I)$. The optimal investment obligation satisfies the following:

$$\frac{dW^I}{d\beta} = \delta \frac{dCS^I}{d\beta} + (1-\delta)\Big[f(\beta) r_\alpha(\alpha^I)\frac{d\alpha}{d\beta} + f' r^d(\alpha^I)\Big] = 0$$

Using (20) and (17.2) and evaluating the first-order condition at $\beta = 0$, we have:

$$\left.\frac{dW^I}{d\beta}\right|_{\beta=0} = \underbrace{\delta[-x_\alpha(\alpha^*, p^*)x_p(\alpha^*, p^*)]}_{(+) \text{ if } \frac{\lambda}{1-\lambda} > \hat{\lambda}} + (1-\delta)\Big[f(\beta) r_\alpha(\alpha^*)\frac{d\alpha}{d\beta} + \underbrace{f' r^d(\alpha^*)}_{(-)}\Big] \tag{26}$$

Therefore, an investment obligation can still increase the overall domestic welfare in a foreign-biased environment when the domestic producer is included in the welfare function, especially when the domestic producer plays a prominent role in the welfare maximisation, as indicated by $\frac{\delta}{1-\delta} < \left|\frac{f(\beta) r_\alpha(\alpha^*)\frac{d\alpha}{d\beta} + f' r^d(\alpha^*)}{x_\alpha(\alpha^*, p^*) x_p(\alpha^*, p^*)}\right| \equiv \hat{\delta}_1$. Note that $\hat{\delta}_1$ increases in $f(\beta)$, so the claim is more likely to hold when the efficiency improvement resulting from the investment is higher. This again relaxes the conditions for welfare-enhancing investment obligation stated in Proposition 4.

With the domestic social welfare of $W^T = \delta CS(x^T) + (1-\delta)\Phi(\alpha^T)$, where $x^T = x(\alpha^T, p^T)$, and $\Phi(\alpha^T) = \theta r^d(\alpha^T)$, the optimal tariff satisfies:

$$\frac{dW^T}{d\tau} = \delta \frac{dCS^T}{d\tau} + (1-\delta)\Phi_\alpha(\alpha^T)\frac{d\alpha}{d\tau} = 0$$

where $\Phi_\alpha(\alpha^T) = \theta r_\alpha(\alpha^T) > 0$. Following the same procedure as under the investment obligation regime, using (23) and (22.2) and evaluating the first-order condition at $\tau = 0$, we have:

$$\left.\frac{dW^T}{d\tau}\right|_{\tau=0} = \delta[-x_\alpha(\alpha^*, p^*)x_p(\alpha^*, p^*)] + (1-\delta)\Phi_\alpha(\alpha^*)\frac{d\alpha}{d\tau} \tag{27}$$

where $\Phi_\alpha(\alpha^*) = r^d_\alpha(\alpha^*) > 0$. The first term is positive if viewers are first-order home-biased and negative otherwise. From Lemma 2, the second term is positive. Therefore, a positive tariff improves the overall domestic social welfare if viewers are home-biased, partly supporting Proposition 5, or if viewers are foreign biased but the domestic government places relatively high importance on the domestic producer, that is, $\frac{\delta}{1-\delta} < \left| \frac{\theta r_\alpha(\alpha^*) \frac{d\alpha}{d\tau}}{x_\alpha(\alpha^*, p^*) x_p(\alpha^*, p^*)} \right| \equiv \hat{\delta}_2$.