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THE RELATIONSHIP BETWEEN CONTENT INVESTMENT AND POLICY

Technical Annex

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Contents

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1 Introduction

This technical annex presents analysis of the relationship between policy to promote investment in AV markets, and investments by broadcaster. The analysis identifies the factors that affect investment in local broadcaster content.

After allowing for factors that influence investment this analysis finds that:

- restrictive policies negatively influence investment in broadcaster content; and
- policy incentives positively influence investment in broadcaster content.

This finding has implications for policy makers who wish to incentivise investment in AV content. Policies such as quotas that are designed to support the sector by increasing the supply of content, may in fact *reduce* the amount of investment supplied. That is because restrictive policies add costs to producers and commissioners and thereby disincentivise new commissions.

2 Background

Policy interventions in AV markets, such as investment obligations, local content quotas and incentives, can influence the supply, production and consumption of "local" content. However, different types of policy will affect commissioners and producers of content in different ways. Restrictive AV policies which *constrain* how services are supplied or impose obligations on providers, will add costs to commissioners and producers. They require suppliers to act in a way that they otherwise would not, in order to meet the relevant obligations. These costs can, all else equal, reduce the attractiveness of investment in content. By contrast incentive policies will reduce the costs of producing content, and therefore *increase* the profitability of content investments.

There is limited empiric evidence of the impact that such policies have on investment. (Katz & Jung, 2020) investigated the causal relationship between restrictive/incentive policies and film production in a given country 2016-2018.[1] The authors found that restrictive AV policies are associated with a "*10% reduction in film production per 100,000 inhabitants*".[2]

This paper estimates the impact that restrictive and incentive policies have on investment in local content produced by broadcasters.

[1] Katz and Jung (2020), Telecom Advisory Services, Quotas And Incentives For The Development Of Domestic Audiovisual Production: Trends And Economic Impact Assessment

[2] Katz and Jung (2020), Telecom Advisory Services, Quotas And Incentives For The Development Of Domestic Audiovisual Production: Trends And Economic Impact Assessment, p. 64

3 The relationship between policy and broadcaster content investment

3.1 Model approach

3.1.1 Introduction

Broadcasters attempt to optimise their profit by creating and licensing content, and distributing the content to audiences in return for subscription revenues and advertising revenues. Creating local content is an important mechanism that broadcasters can use to drive audience and subscribers. Therefore it is possible to consider the factors that contribute to the level of investment in local content. The level of investment will depend on a number of country specific demand factors (the domestic population, the income of the country) and country specific supply factors (these could include the costs associated with AV regulation and policy, and the available incentives which reduce cost of production).

3.1.2 Econometric model

In order to operationalise the relationship described above, the following empirical specification was tested econometrically. The model seeks to estimate the contribution that different variables make in explaining investment in content by broadcasters.

$$\log\left(investment\right)_{i,t} = \sum_{k=1}^{K} \beta_k x_{i,k,t} + a_t\ \varepsilon_{i,t}$$

Where:

- $investment$ is the spend on local content (excluding investment in sports[3]) by broadcasters – dependent variable in the broadcaster regression
- i refers to the individual country
- t refers to the year
- k refers to the individual explanatory variable
- K is the total number of explanatory variables
- x is a list of explanatory variables (see below)
- a refers to the use of fixed effects. a_t means one-way, time fixed effects is used
- ε is the error term

[3] Investment in sports is less related to policy, and instead reflects demand and consumer willingness to pay for sport. The level of investment in sports content varies significantly from country to country in a way that is not reflected by policy, and instead reflects country variation in demand for different sports.

The explanatory variables for the broadcaster model are in Table 1. The controls shaded in grey are used as additional variables in robustness checks but do not feature in the core specification.

Table 1 Broadcaster – Explanatory variables

Independent variables	**incentive_4cat**	A variable for different levels of policy incentives (no incentive, low, medium, high). A "0" is recorded where there are no incentives, with the variable taking "1", "2" or "3" where there is either of low, medium or high incentives.
	stri_bc_total	The OECD Services Trade & Restrictiveness Index (STRI) score in the 'Broadcasting'' sector. It takes a range of 0 (least restrictive) to 1 (most restrictive) and factors in a wide range of aspects when considering a countries regulatory environment.
Control variables	**log(gdpcapita)**	The GDP per capita in a given country and year, logged.
	log(pop)	The population in a given country and year, logged.
	USdummy	A dummy variable to control for a separate impact on the USA, due to considerably higher investment representing it being a potential outlier.
	Spanish_lang_dummy	A dummy variable to identify countries where Spanish is the official or native language. Broadcasters producing in these countries will benefit from the increased exportability of content in Spanish.
	publiclicense_revshare	The share of total revenue that comes from public licensing.
	fdiflowpct	A continuous variable for the FDI inflow (as a % of GDP).
	svodpenmaj	A continuous variable measuring the SVOD market maturity. It is calculated as the number of SVOD subscribers divided by the number of households for a given year and country.
	English_lang_dummy	A dummy variable to identify countries where English is the first language of at least 50% of the population. Broadcasters producing in these countries will benefit from the increased exportability in English.

	French_lang_dummy	A dummy variable to identify countries where French is widely spoken. Broadcasters producing in these countries will benefit from the increased exportability in French.
	Dutch_lang_dummy	A dummy variable to identify countries where Dutch is the first language of at least 50% of the population. Broadcasters producing in these countries will benefit from the increased exportability in Dutch.
	Portuguese_lang_dummy	A dummy variable to identify countries where Portuguese is the first language of at least 50% of the population. Broadcasters producing in these countries will benefit from the increased exportability in Portuguese.

Note: The controls shaded in grey are ones that are used as additional variables in the robustness checks. Uses data from 2018-2022. While data is available for earlier than this period it was considered that in many countries the relationship between investment and the demand and supply variables may not be stable since the markets were not yet mature.
The French_lang_dummy contains France, Belgium & Canada; whilst Belgium & Canada do not have at least 50% first language French speakers, in order to test a French language dummy, they are included.

3.1.3 Modelling approach

Log-linear specification

The dependent variable data on investment in content is logged in order to control for heteroskedasticity. Log-linear models can help stabilise the variance of the dependent variable, making it more likely that the assumption of homoscedasticity (constant variance of errors) is met. Moreover, taking logs of the dependent variable helps reduce skew which is beneficial to the model by getting the data closer to normally distributed.

The standard log-linear regression with continuous independent variables estimates coefficients that are interpreted as a one unit increase in the independent variable is associated with an $(100 * X)\%$ change in the dependent variable.

Fixed effects vs random effects

A two-way fixed effects model, as below, had been considered:

$$y_{i,t} = a_i + a_t + \beta' x_{i,t} + \varepsilon_{i,t}$$

where $y_{i,t}$ is a measure of investment and $x_{i,t}$ is a vector of explanatory variables including policy measures. The parameters of interest are the elements of the β corresponding to the policy variables. The a_t are time effects that capture factors that change over time and influence all countries equally, such as COVID.

These effects, captured by year dummy variables, are large and significant.

The problematic issue is the treatment of a_i, the country effects. There are three possibilities: the ordinary least squares, OLS estimator sets $a_i = a$; The random effects, RE, estimator, treats a_i as random, uncorrelated with the $x_{i,t}$; the fixed effect, FE, estimator, estimates it directly. FE just uses the within country time series variation around the country mean, using in the regression $y_{i,t} - \bar{y_i}$ and $x_{i,t} - \bar{x_i}$. Since the panel consists of a relatively small time period ($T = 5$), and the policy variables do not vary very much over this period, the within country variation $T^{-1}\sum(x_{i,t} - \bar{x_t})^2$ is very small. In consequence, the estimates of β are imprecise, with large standard errors. In just using the "within variation", the FE estimator also discounts all the information provided by the between country, cross section relationship: the fact that different countries with different policies have different levels of investment.

This is a well-known problem. For instance, Robert Barro, one of the leading experts on cross country growth, discusses this issue. (Barro, 2015) says: "*Inclusion of country fixed effects also affects the estimated coefficients and, especially, standard errors of explanatory variables – X variables – other than lagged dependent variables. Coefficients on country variables that are constant (such as geographical features and colonial history) cannot be estimated at all and variables that have little within-country time variation cannot be estimated with precision. In effect, the inclusion of country fixed effects throws out much of the information in isolating the effects of X variables on growth rates or other variables*."[4] Barro uses OLS with time dummy variables.

The third estimator, random effects, is intermediate between OLS and fixed effects. Rather than using $x_{i,t} - \bar{x_i}$ it uses $x_{i,t} - \rho\bar{x_i}$, where ρ is estimated from the between and within country error variances. However, the random effect will suffer largely the same problem as fixed effects by stripping out nearly all the information between country variation. Thus, following from Barro, random/fixed country effects are not used, in favour of one-way time fixed effects.

Endogeneity

There is scope for endogeneity in the proposed specification. The independent variables may be endogenous to other independent variables or to the dependent variable. For example, the level of SVOD penetration will explain the level of investment, but may also be caused by the level of investment. Similarly there may be omitted variables that affect the dependent variable, and that are correlated with the independent variable. Both cases can introduce estimate bias.

In order to treat endogeneity it is necessary to identify an instrument (i.e. a variable) that is correlated with the regressor independent variables that is exogenous to the dependent variable. In practice finding an instrument that is truly exogenous can be difficult. However,

[4] Barro, R. J. (2015) Convergence and Modernisation, The Economic Journal, 125, p. 911-942.

the use of an inappropriate or weak instrument can fail to correct for endogeneity and even lead to more severe issues surrounding the validity and efficiency of your estimators.

In this case the policy environment is relatively fixed in the period over which the analysis is being undertaken. It can therefore be considered as "given" and treated as pre-determined, meaning that policy changes are less influenced by the variables being studied, effectively making them exogenous.

3.2 Data

Data was sourced from publicly available sources.

Data on broadcaster investment in local content production has been collected from Ampere. It has data on broadcasting investment for 36 countries (27 of which are used in our main model specification due to the availability of data for other variables in our model). Ampere collects broadcasting investment in content using P&L data. Ampere data is calculated using end of year exchange rates.

The specification includes the use of language dummies. These allow for the fact that investment in a country may be affected by the fact that the country's language is spoken widely in other countries, meaning that (i) there is a wide potential international market for any content investments (which might increase the value of investments); and (ii) there are a large volume of original language content investments from other countries that could be acquired on licence to be shown in a country (and hence might reduce the value of investments). The sign of the coefficient would in principle indicate which of these effects dominates.

The language dummies are based on countries in our modelling where more than 50% of the population speak the given language as a first language; and that the language is widely spoken around the world such that it would have measurable impacts on incentives to invest (for example languages spoken by at least 100m population). In particular, the main model uses a Spanish language dummy in order to capture its global presence (it is spoken as a native language by approximately 500m people[5]). The robustness checks include various other language dummies for languages that are spoken in multiple countries: English (where there are 400m native speakers[6]); French, noting that Belgium and Canada are included in this, despite less than 50% speaking French in each country; Dutch; and Portuguese. In creating the appropriate specification it is necessary to be parsimonious with country and language specific dummy variables which can effectively remove the effect of cross country variation on coefficient estimates and rely more on time series estimates. Since the policy variables are relatively stable over time, the inclusion of multiple dummies would reduce the precision of the coefficient estimates. Therefore, the chosen specification includes only

[5] https://www.exteriores.gob.es/en/PoliticaExterior/Paginas/ElEspanolEnElMundo.aspx

[6] https://en.wikipedia.org/wiki/English-speaking_world#:~:text=As%20of%202022%2C%20there%20were,1.5%20billion%20to%202%20billion.

Spanish (which is significant at the 5% level), though the impact of using other dummies on the coefficient estimates is also shown in the robustness checks.

3.2.1 Data sources

Table 2 Broadcaster – Variable sources

	Variable	Source
Dependent variable	Investment in content by broadcasters	Ampere data
Independent policy variables	Incentive policy (tax incentives etc.)	Olsberg SPI KFTV Other country specific sources such as national AV boards
	Restrictive policy (STRI)	OECD Services Trade & Restrictiveness Index (STRI), 'Broadcasting' section
Control variables	GDP per capita	TeleGeography Telegeography uses nominal GDP at current market rates – sourced from the WorldBank
	Population	TeleGeography
	Spanish_lang_dummy	Frontier research
	publiclicense_revshare	PWC Global Entertainment & Media Outlook Revenue data
	FDI Inflow	TheWorldBank
	SVOD penetration	Ampere (for subscriber count) TeleGeography (for household numbers)
	English_lang_dummy	Frontier research
	French_lang_dummy	Frontier research
	Dutch_lang_dummy	Frontier research
	Portuguese_lang_dummy	Frontier research

Note: All data is nominal. Data collected from 2018-22

3.2.2 Policy Classification:

Incentive and restrictive policies applying to broadcasters in various countries were classified into groups.

Automatic production incentives

For automatic production incentives, an index was created which attempts to factor in the most important aspects of a country's policy, such as the incentive percentage and the budget cap as well as more nuanced details relating to the ease and reliability of a policy.

As explained in section 2.2.1 of the main report, there are various types of automatic production incentives. Whilst they all have similarities, with rebates being the most common, they have structural differences. Ultimately, these policies have various quantitative and qualitative aspects that contribute to the scheme's "generosity". This can include the percentage of the rebate, the budget cap, as well as the eligible costs that apply. For practical purposes, rebates, tax credits and tax shelters are treated as similar and compare the headline percentage rate offered and budget cap, and the key determining factors which define the scheme's generosity, while also considering the more practical, country-specific aspects on a case-by-case basis.

The analysis categorises incentives based on four levels (none, low, medium, high):

- **None**: no incentive policy in place or a production incentive limited only to a small area within the country.
- **Low**: low incentive policy % (typically <20% of allowable costs) or in some cases countries with a slightly higher % but a limiting budget cap (e.g. Norway has an annual budget cap <$10m). Turkey has strict screening and qualifying requirements meaning that the scheme is not reliable.
- **Medium**: medium incentive policy % (typically ~25% rebate or similar) or cases where countries have a lower % but with no budget cap. Individual adjustments have been made based on country-specific nuances; e.g. Belgium requires a middle company to facilitate their scheme which effectively increases barriers to access (hence a medium, not high, incentive level).
- **High**: higher incentive policy % (typically ~30% rebate or similar) with no caps and/or high level of coverage of eligible costs.

Data on the prevalence and use of foreign automatic production incentives for inward investment was predominantly sourced from Olsberg SPI and KFTV. In the case of countries with national schemes *and* regional schemes in place, the analysis focuses on the national scheme as it is likely to be more representative of what incentives are available to producers (not reliant on production in a particular region). For example, in Spain, the 30% national rebate scheme was considered, as opposed to the 45% offered in the Canary Islands (note both would put Spain in the high incentive category). For countries with multiple regional schemes instead of one single unified scheme, an average of the schemes in some of the largest regions for film production was taken. For instance, for the US, where incentive policies are state-dependent, an averaging of state incentive rates, weighted by states with the highest production, was used. For Canada, the typical rate available to a producer in some of the most

popular provinces in Canada was adopted. They are able to stack regional incentive schemes on top of the federal 16% tax credit to result in an average incentive across British Columbia, Quebec and Ontario that puts it in the high incentive category.

Restrictions:

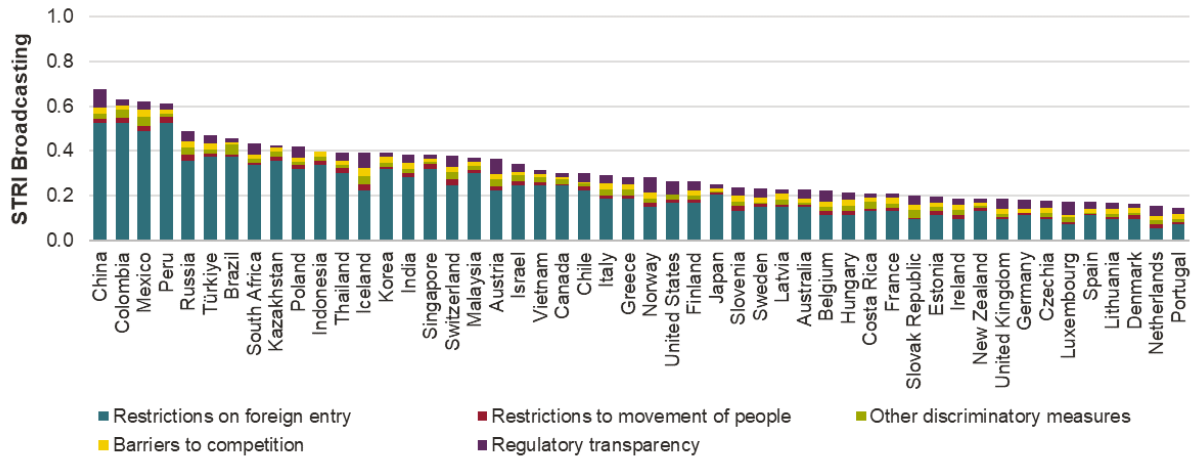
The level of policy restrictiveness is proxied by the Broadcasting STRI - an OECD produced index that considers a wide range of factors that make up the broader regulatory environment of a countries broadcasting sector. It is based on an extensive questionnaire to which the answers are weighted to compute an overall index score for a given country.

The Broadcasting STRI (see Figure 1 below for the 2022 index) scores countries policy restrictiveness in the broadcasting sector: 0 (least restrictive) to 1 (most restrictive). The OECD scores the level of policy restrictiveness in the broadcasting sector for 50 countries. Scores range from 0.14 (Portugal) to 0.67 (China). The scores are estimated based on 86 measures in 5 different pillars.

1. **Restrictions on foreign entry**: restriction on form of investments companies, leadership of companies, quotas, mergers, copyright law, cross border data,
2. **Restrictions on movement of people**:
3. **Other discriminatory measures**: discriminatory tax breaks, presence of a cultural test, copyright
4. **Barriers to competition**: government control of broadcasters
5. **Regulatory transparency**: intellectual property rights

The STRI is well recognised and understood. Additionally, it has a comprehensive view of policy restrictiveness across the sector that is comparable across countries.

Figure 1 Broadcasting STRI ranking (2022)



Source: *OECD STRI, https://stats.oecd.org/Index.aspx?DataSetCode=STRI, https://sim.oecd.org/?lang=En&ds=STRI&d1c=asbrd&cs=asbrd*

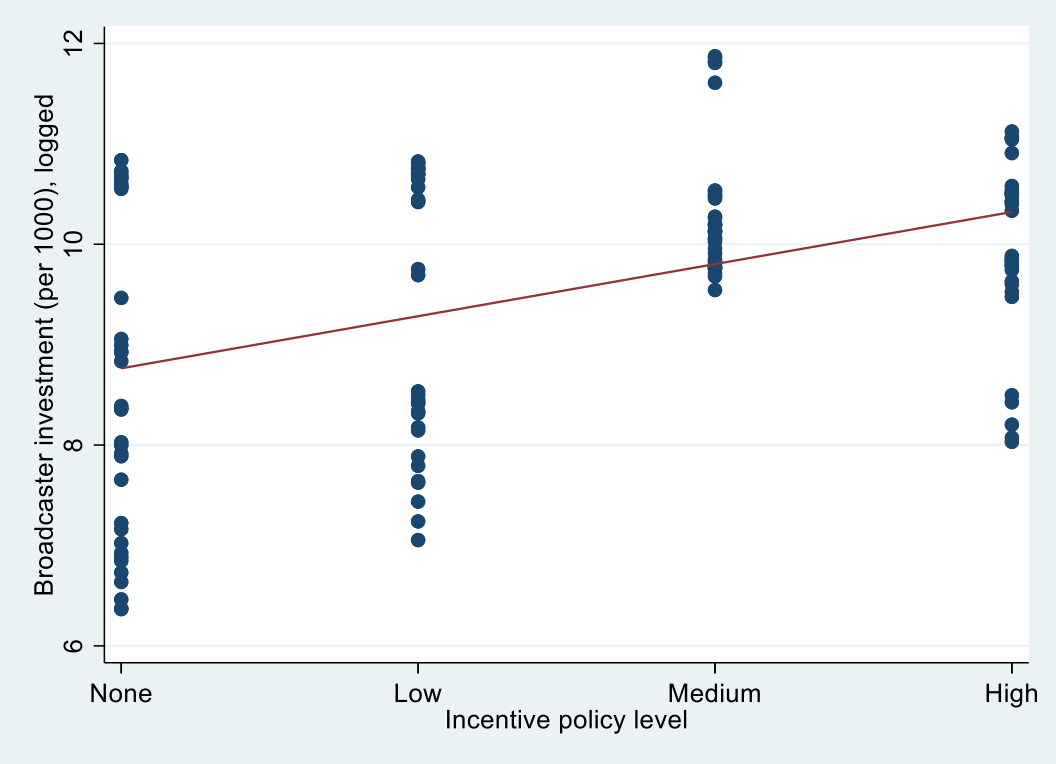
Note: *Not all countries here have been used in the econometric model due to data limitations of other variables, namely the broadcaster investment data. The colours relate to the 5 categories the score is split into, with the largest section (blue) representing "restrictions on foreign entry". For example, this includes question 1.3.23 "Broadcast time is regulated by quotas".*

3.3 Scatter plots between dependent variable expressed on a per capita basis and policy variable

Scatter plots are a useful introductory way to explore the relationship between the dependent and independent variables. They can show the correlation between the two variables. Note that the correlation does not reflect causality as it fails to consider the control variables that have been used in the regression models. In this case, the dependent variable of broadcaster investment in content, weighted by population size, is shown and compared to the policy variables.

Figure 2 (below) shows a positive relationship between broadcaster investment in content production and the level of incentive policy.

Figure 2 Broadcaster – Incentives scatter plot

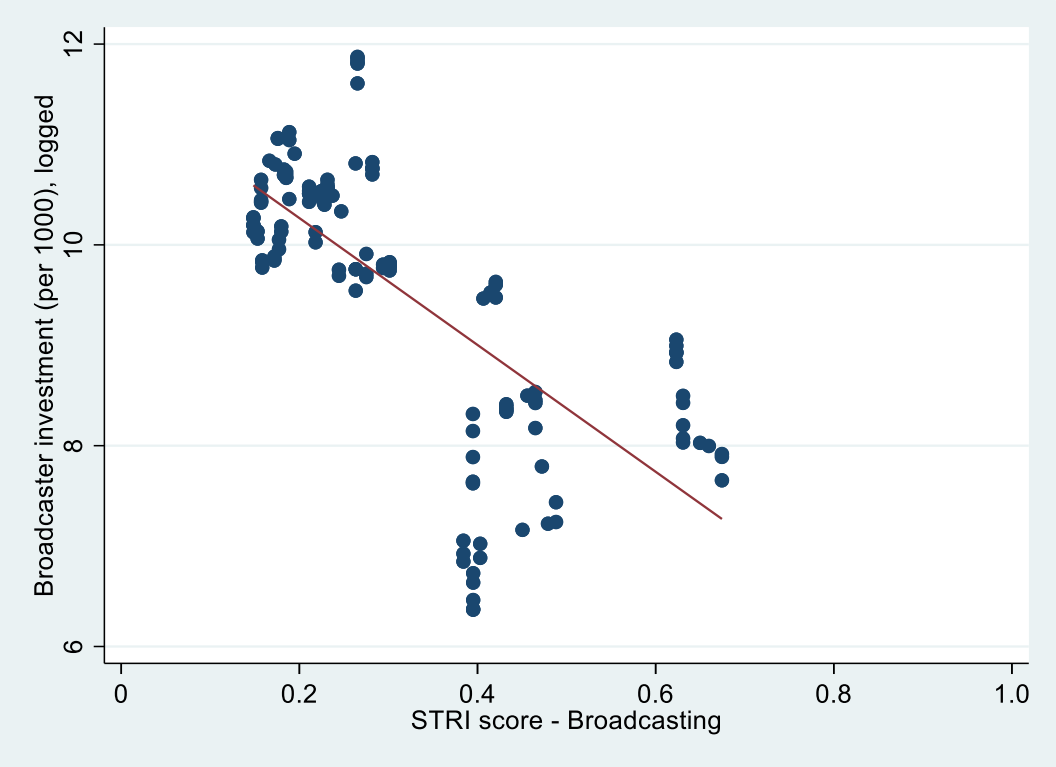


Source: *Frontier Analysis*

Note: *The vertical axis is logged broadcaster content investment per 1,000 people, in 27 countries across 2018-2022; the horizontal axis shows production incentives. Broadcaster investment has been logged to normalise the data and reduce the variability of investment levels across countries to make it easier to visually depict.*

Figure 3 (below) shows a negative relationship between broadcaster investment in content and the STRI score.

Figure 3 Broadcaster – Restrictions scatter plot



Source: *Frontier Analysis*

Note: *The vertical axis is logged broadcaster content investment in 27 countries, per 1,000 people, across 2018-2022; the horizontal axis shows restrictions, modelled using the STRI Broadcasting score. Broadcaster investment has been logged to normalise the data and reduce the variability of investment levels across countries to make it easier to visually depict. This takes values between 0 (least restrictive) and 1 (most restrictive).*

4 Results

4.1 Main result

Table 3 below presents the primary regression results for broadcaster investment (using the dependent variable of logged broadcaster investment in local content). Table 3 shows that there is a statistically significant positive relationship between incentive policies and broadcaster investment in local content; and a statistically significant negative relationship between the restrictive environment (STRI) and investment.

Table 3 Primary Broadcaster regression results

Variables	**Coefficients**	(Standard errors), *(p-value)*
incentive_4cat	**0.065****	(0.020), *(0.033)*
stri_bc_total	**-1.455*****	(0.134), *(0.000)*
USdummy	**1.239*****	(0.031), *(0.000)*
log(GDPpercapita)	**1.022*****	(0.016), *(0.000)*
log(population)	**0.994*****	(0.008), *(0.000)*
spanish_lang_dummy	**0.527*****	(0.034) *(0.000)*
publiclicense_revshare	**0.597*****	(0.067), *(0.001)*
constant	**-7.390*****	(0.363), *(0.000)*
Observations	**135** (27 countries, 5 years)	
R-squared	**0.907**	

Source: *Frontier Analysis*

Note: ** indicates results that are significant at the 10% level; ** indicates results that are significant at the 5% level; *** indicates results that are significant at the 1% level. These levels are widely used as measures of significance. The coefficients show the impact of the explanatory variable on the dependent variable (broadcaster investment in content). Robust standard errors are given. The R-squared noted is the "overall" R-squared. The p-value should be considered in order to determine the significance of the results. A p-value represents the probability of the sample mean being equal to or more extreme than the observed value. Informally this means that a p-value less than 0.1 / 0.05 / 0.01 (depending on the desired significance level), indicates that the coefficient is statistically significant.*

4.2 Robustness tests

The robustness of the results were tested by assessing the impact of a number of alternative specifications on the coefficient estimates. Table 4 presents nine alternative specifications which either includes additional controls or excludes certain controls from our main results.

- Specification [I] includes FDI inflow to the main model to capture the broader appeal of investing in a country, as FDI is looking at the extent to which there is already foreign direct investment flowing into the country.
- Specification [II] includes the SVOD penetration rate to the main model. This is a proxy for the maturity of the SVOD market which could be controlled for in order to capture the degree of competition facing broadcasters.
- Specification [III] – [VI] adds various language dummies as well as the Spanish language dummy to the main model. This helps to control for other widely spoken markets where content produced would naturally be more exportable to international markets and hence more valuable to the producer than an equivalent investment in a country where the predominant language is less widely spoken.
  - Specification [III] includes an English language dummy
  - Specification [IV] includes a French language dummy
  - Specification [V] includes a Dutch language dummy
  - Specification [VI] includes a Portuguese language dummy
- Specifications [VII] – [IX] ensure robustness by checking if the results are contingent on the inclusion of certain control variables. As such, in specifications [IV] – [VI] various control variables are excluded from the main model.
  - Specification [VII] excludes the US dummy
  - Specification [VIII] excludes the Spanish language dummy
  - Specification [IX] excludes the public license share of revenue

Table 4 Broadcaster – additional specifications

	Coefficient (Standard errors), *(p-value)*								
Variable	**[I]**	**[II]**	**[III]**	**[IV]**	**[V]**	**[VI]**	**[VII]**	**[VIII]**	**[IX]**
incentive_4cat	**0.062** (0.021), *(0.043)*	**0.061** (0.021), *(0.045)*	**0.077** (0.025), *(0.035)*	**0.076** (0.025), *(0.037)*	**0.062** (0.020), *(0.038)*	**0.053** (0.021), *(0.064)*	**0.071** (0.018), *(0.016)*	**0.107** (0.019), *(0.005)*	**0.082** (0.016), *(0.006)*
stri_bc_total	**-1.491** (0.153), *(0.001)*	**-1.399** (0.106), *(0.000)*	**-1.453** (0.134), *(0.000)*	**-1.442** (0.143), *(0.001)*	**-1.449** (0.134), *(0.000)*	**-1.300** (0.116), *(0.000)*	**-1.609** (0.143), *(0.000)*	**-0.930** (0.166), *(0.005)*	**-1.315** (0.069), *(0.000)*
log(GDPpercapita)	**1.028** (0.015), *(0.000)*	**0.947** (0.034), *(0.000)*	**1.033** (0.016), *(0.000)*	**1.034** (0.017), *(0.000)*	**1.016** (0.014), *(0.000)*	**1.073** (0.014), *(0.000)*	**1.176** (0.021), *(0.000)*	**1.005** (0.016), *(0.000)*	**1.035** (0.021), *(0.000)*

	Coefficient (Standard errors), *(p-value)*								
Variable	**[I]**	**[II]**	**[III]**	**[IV]**	**[V]**	**[VI]**	**[VII]**	**[VIII]**	**[IX]**
log(population)	**0.998*** ** (0.006), *(0.000)*	**0.984*** ** (0.010), *(0.000)*	**0.999*** ** (0.009), *(0.000)*	**1.000*** ** (0.009), *(0.000)*	**0.997*** ** (0.008), *(0.000)*	**1.006*** ** (0.008), *(0.000)*	**1.100*** ** (0.008), *(0.000)*	**0.972*** ** (0.007), *(0.000)*	**0.970*** ** (0.013), *(0.000)*
USdummy	**1.222*** ** (0.031), *(0.000)*	**1.036*** ** (0.080), *(0.000)*	**1.268*** ** (0.038), *(0.000)*	**1.192*** ** (0.031), *(0.000)*	**1.258*** ** (0.030), *(0.000)*	**1.229*** ** (0.031), *(0.000)*		**1.239*** ** (0.031), *(0.000)*	**1.211*** ** (0.035), *(0.000)*
spanish_lang_dummy	**0.524*** ** (0.034), *(0.000)*	**0.501*** ** (0.043), *(0.000)*	**0.507*** ** (0.038), *(0.000)*	**0.509*** ** (0.035), *(0.000)*	**0.539*** ** (0.036), *(0.000)*	**0.589*** ** (0.035), *(0.000)*	**0.527*** ** (0.031), *(0.000)*		**0.456*** ** (0.037), *(0.000)*
publiclicense_revshare	**0.546*** ** (0.082), *(0.003)*	**0.758*** ** (0.048), *(0.000)*	**0.524*** ** (0.060), *(0.001)*	**0.550*** ** (0.066), *(0.001)*	**0.679*** ** (0.079), *(0.001)*	**0.731*** ** (0.076), *(0.001)*	**0.135*** (0.060), *(0.086)*	**0.479*** ** (0.067), *(0.002)*	
fdiflowpct	**0.005** (0.003), *(0.197)*								
svodpenetration		**0.259*** ** (0.053), *(0.008)*							
english_lang_dummy			**-0.077*** (0.034), *(0.082)*						
french_lang_dummy				**-0.094*** (0.038), *(0.069)*					
dutch_lang_dummy					**0.215*** ** (0.035), *(0.003)*				
portuguese_lang_dummy						**0.499*** ** (0.050), *(0.001)*			
constant	-7.500*** (0.303), *(0.000)*	-6.591*** (0.572), *(0.000)*	-7.598*** (0.391), *(0.000)*	-7.624*** (0.420), *(0.000)*	-7.390*** (0.356), *(0.000)*	-8.186*** (0.309), *(0.000)*	-10.681*** (0.409), *(0.000)*	-7.029*** (0.364), *(0.000)*	-7.118*** (0.470), *(0.000)*
Observations	**135** (27 countries, 5 years)	**135** (27 countries, 5 years)	**135** (27 countries, 5 years)	**135** (27 countries, 5 years)	**135** (27 countries, 5 years)	**135** (27 countries, 5 years)	**135** (27 countries, 5 years)	**135** (27 countries, 5 years)	**145** (29 countries, 5 years)
R-squared	**0.907**	**0.907**	**0.907**	**0.908**	**0.908**	**0.916**	**0.887**	**0.896**	**0.925**

Source: *Frontier Analysis*

Note: ** indicates results that are significant at the 10% level; ** indicates results that are significant at the 5% level; *** indicates results that are significant at the 1% level. These levels are widely used as measures of significance. The coefficients show the impact of the explanatory variable on the dependent variable (broadcaster investment in content). Robust standard errors are given. The R-squared listed is the "overall" R-squared.*

The coefficients and the significance of the policy variables are stable across all specifications [I-IX]. The coefficient on the restriction (STRI) variable is very stable across specifications, with significance at the 1% level in all specifications. Similarly, the incentive variable is also consistent and significant in all specifications, with significance at the 5% level in all specifications and at the 1% level in specifications [VIII] and [IX].

Across all robustness checks and the main model, the incentive variable coefficient ranges from 0.053 to 0.107. The coefficient used in the main model (0.065) is on the lower end of this range suggesting that in comparison to the robustness checks, our main model coefficient on incentives is somewhat conservative.

Similarly, across all robustness checks and the main model, the STRI restriction coefficient ranges from -0.930 to -1.609. The coefficient used in the main model (-1.455) is in the middle of the robustness checks, noting that the -0.930 value in specification [V] appears to stand out as an outlier in comparison to the other robustness checks. This indicates that the primary coefficient of the main model for the STRI variable aligns with the findings from the robustness checks.

5 Conclusions

This annex presents the results of an OLS regression analysis in order to determine the likely impact of incentive/restrictive policy on the investment in broadcaster local content production based on data from 2018-22. Regression analysis examines the impact on broadcaster investment whilst controlling for other factors that may also affect investment. As discussed in section 4.5 of the main report, the coefficient X can be interpreted as follows.

For incentives, the coefficient X can be approximately interpreted as the impact of increasing the level of the incentive policy on a $(100 * X)\%$ change in the dependent variable. For the STRI coefficient reports the % change in investment given a change from the minimum possible level (0) to the maximum possible level of STRI (1). In practice it can be helpful to interpret the STRI variable by considering components that make up the country score. For example the broadcasting STRI has three questions on quotas which contribute 5.65% of the overall score:

- 1_3_31 Broadcast or airtime quotas are in place for motion pictures. *Weighting: 0.019*
- 1_3_32 Broadcast time is regulated by quotas. *Weighting: 0.019*
- 1_3_33 The number of foreign channels is limited by quotas. *Weighting: 0.019*

The application of quotas therefore represents 5.65% of STRI index. Hence the imposition of quotas would lead to a $(5.65 * X)\%$ reduction in investment compared with no quotas.

5.1 Interpretation of the results

The results in the main specification find that **moving up one level of incentive policy results in a 6.5% increase in broadcaster investment in content**. This estimate of the coefficient on the incentive policy variable is significant at the 5% level, giving confidence to the positive relationship between incentives and broadcaster investment.

The estimate of the coefficient on the STRI policy variable variables requires a slightly more nuanced interpretation as discussed above. The main model coefficient of -1.455 can be interpreted to suggest that **the imposition of quotas would lead to a ~8.2% reduction in broadcaster investment in content** (i.e. $-1.455 * 5.65$). Given the significance at the 1% level, the coefficients and p-values of the STRI policy variable, demonstrates a negative (and strongly significant) relationship between investment and restrictive policies.

Furthermore, the model typically reports an R-squared value in excess of 0.9 (in the main model and the robustness checks), implying a robust explanatory power of our model. The high R-squared provides strong support for the reliability and goodness-of-fit of our econometric framework, affirming the substantial proportion of variation in the dependent variable accounted for by our chosen independent variables.

6 Bibliography

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