

TECHNICAL ANNEX



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ECONOMETRIC ANALYSIS OF THE RELATIONSHIP BETWEEN PROTECTIONIST POLICIES AND AUDIOVISUAL TRADE

Frontier Economics carried out a quantitative econometric assessment of the impact of protectionist policies on trade in AV services. The econometric modelling found that higher levels of protectionist policies lead to reductions in AV exports.

METHODOLOGY

In order to quantify the impact of cultural restrictions on AV trade, Frontier Economics conducted an econometric analysis of the relationship between policy restrictions in the AV sector and international trade within that sector. Policy restrictiveness is measured by the Organisation for Economic Co-operation and Development's (OECD) Services Trade Restrictiveness Index - STRI. A "gravity model" was used to estimate the relationship.

Gravity models are based on the premise that trade between pairs of markets is affected by each market's size and the distance between them. Hence the term gravity model (borrowed from planetary gravity): just as planets are attracted to each other in proportion to their sizes and proximity, so trade gravitates to geographically close and big economies.

The analysis models the factors that affect trade between different markets. As well as size (measured by GDP) and distance, these include:

- common language (markets with common languages trade more for example, the UK and Australia);
- historical ties (Brazil and Portugal);
- shared border (Argentina and Paraguay); and,
- the degree of protectionism will also determine trade (markets with protectionist policies will, all else equal, export and import less).

EXECUTIVE SUMMARY

This technical annex provides further detail on the methodology used in the analysis for the White Paper, 'The Economic Impact of Video on-demand services in Australia'. The White Paper summarises the impact of protectionist policies in video content production and highlights the economic impact of Video on-demand (VOD) providers.

Three pieces of original research were conducted for the study:

1. Econometric analysis of the relationship between protectionist policies and audiovisual trade. The analysis compared historical trade data between markets and modelled the impact of a market's policy restrictions. It found that higher levels of protectionist policies, such as the introduction of content quotas, lead to reductions in AV exports, hurting the economic potential of local AV industries.

2. A consumer survey. The survey interviewed 1,107 internet users in Australia to quantify demand for Australian content and understand consumer opinions of online streaming services. The survey found VOD services to be meeting high levels of consumer demand in terms of quantity of local content.

3. Analysis of content catalogues of VOD services. The analysis identified the number of local "original" VOD productions and compared the data to subscriber numbers. Pre-pandemic data was used due to the uneven impact of the pandemic on AV industries across the world. It found that VOD services are investing in line with subscriber numbers in each market.

The gravity model approach allows the estimation, at a high level, of the impact of a market's policy restrictions, compared to a less restrictive environment. That is to say, it allows the estimation of the elasticity of services trade (imports and exports) with respect to a change in the level of policy restrictions.

DATA

The main dataset, including distance, GDP and other variables, is from the Centre d'Études Prospectives et d'Informations Internationales (CEPII).¹

Bilateral services trade data is from OECD EBOPS² and is reported for a number of different sectors.

The magnitude of trade restrictions in broadcasting can be measured using the OECD's STRI.³ To create the STRI, the OECD collects experts' responses to questions on trade restrictions from each market in the dataset. The answers are then assigned a score and weighted based on expert judgment. Weighted scores are then added up to give a market level score. This measure is calculated on a sector-by-sector basis for each market, including the broadcasting sector, and is widely used by academics and policymakers. However, the STRI has some limitations:

- 1 the measure does not distinguish between restrictions facing traditional broadcasters and online video service (VOD) providers, with the scores mostly driven by traditional broadcasting curbs; and,
- 2 the STRI questionnaire contains mostly binary questions that cannot capture perfectly the significance of the restrictions in practice.

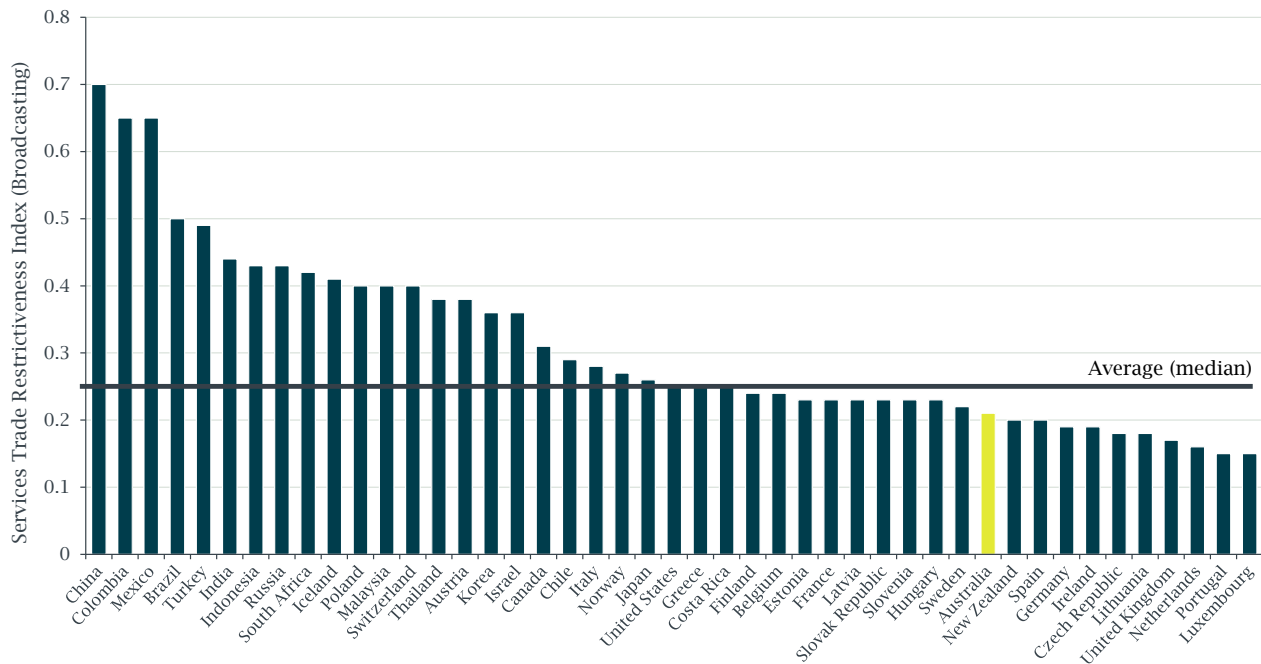
Despite this, the STRI is the most appropriate and recognised measure for such analysis. The figure below shows the 2019 broadcasting STRI for all 46 markets for which data is available.

¹ http://www.cepii.fr/cepii/en/bdd_modele/presentation.asp?id=8, dataset originally developed for HEAD, K., T. MAYER AND J. RIES, 2010, "The erosion of colonial trade linkages after independence" Journal of International Economics, 81(1):1-14.

² <https://stats.oecd.org/Index.aspx?DataSetCode=TISP>

³ <http://stats.oecd.org/Index.aspx?DataSetCode=STRI>

FIGURE 1 BROADCASTING STRI BY MARKET



Source: OECD STRI 2019 - Broadcasting sector

SPECIFICATION AND RESULTS

The model predicts trade from market I to market J as a function of the size of the two markets (log GDP), the STRI scores of the two markets, a series of dyadic variables X (log distance and dummies for common language, shared border, colonial relationship, and whether EU pair), year dummies and sector dummies.⁴

This can be written as follows:

$$\text{Trade flow}_{ijst} = b_0 + b_1 \log \text{GDP}_i + b_2 \log \text{GDP}_j + b_3 \text{STRI}_i + b_4 \text{STRI}_j + b_5 X_{ij} + b_6 \text{yr}_t + b_7 \text{sector}_s + u_{ijst}$$

It is possible to estimate the elasticity of trade with respect to the STRI on a sector-by-sector basis, and an estimate based specifically on the AV sector was tested. However, sector-specific results are not consistent across sectors and are particularly sensitive to outliers and data limitations.⁵ For example, the AV sector estimate is strongly influenced by inclusion of the US. Therefore, results from a pooled subsample of sectors were used as the central estimate of the elasticity of trade with respect to the STRI. This

⁴ The regression is estimated using a poisson pseudo-maximum likelihood (PPML) approach, following the Nordas-Rouzet paper. The coefficients in a PPML regression give the proportional change in the dependent variable in the same way as in an OLS regression with a logged dependent variable. In both cases the percentage change in the dependent variable for a change in variable X is given by $\exp(\beta \text{var} \Delta \text{var}) - 1$. The PPML approach is argued to be better for dealing with missing observations and is described in detail in Silva and Tenreyro (The Log of Gravity, Review of Economics and Statistics, 2006. The authors use Monte Carlo simulations to compare the performance of log-linear OLS and PPML estimators).

⁵ The priority was to estimate reliable parameters on the variables of interest to describe the relationship between AV trade and the STRI. Therefore, a parsimonious approach was adopted to estimate parameters that were robust and stable, rather than attempt to over-specify the model to increase its overall predictive power (leading to a higher R-squared). The "AV sector only" model had an R-squared of 0.70 but the co-efficients were unstable partly due to outliers (not least the US, which has a significant impact on parameter estimates). The specification chosen therefore moderates the instability in the parameters by drawing on relationships from other sectors.

incorporates service sectors such as AV, telecoms, financial services and computing, but excludes transport and construction services. This pooled specification uses the maximum amount of variation available in the data by drawing on trade relationships for similar sectors and is less prone to influence from outliers.

The results of the pooled regression are shown in Table 1 below. The negative exporter STRI coefficient in both specifications shows that higher levels of protectionist policies (for example the introduction of content quotas or investment obligations), which would increase the STRI, are negatively associated with AV trade and lead to reductions in AV exports. This negative association is the key finding of the econometric analysis. The values shown below illustrate examples of what this could mean in practice for exports.

The first column includes all 14 sectors for which STRI data is available. The exporter STRI coefficient of -1.53 means that if the STRI score is reduced by five percentage points and made less restrictive, trade would be increased by 8%.⁶ The other coefficients, for example on GDP and distance, are comparable to other gravity model estimates of services trade. The second column shows a more targeted specification with results relating to nine sectors most comparable to the sectors of interest, focusing on communications and professional services (transport, logistics and construction are excluded). The STRI coefficients become somewhat larger. The results were sensitivity tested by considering how elasticities were responsive to removing outliers and to reweighting the components of the STRI index.

The effect of the relationship between trade and policy restrictiveness can be considered by illustrating the impact of content obligations. Introducing local content obligations for broadcast time increases STRI by 1.8 points (0.018). The exporter STRI coefficient of -2.441 in the second column means that if, for example, local content obligations for broadcast time were introduced in a market (increasing the STRI score by 1.8 percentage points), AV exports would be reduced by approximately 4.3%.⁷

⁶ Using the marginal effects formula above, this is given by $-1.53 \times .05 = 8\%$.

⁷ Using the marginal effects formula above, this is given by $-2.441 \times 0.018 = -4.3\%$.

TABLE 1 REGRESSION OUTPUT FOR POOLED REGRESSIONS

	POOLED	POOLED SUB-SAMPLE (MAIN ESTIMATE)
Log distance	-0.591 [22.29]**	-0.666 [14.47]**
Log GDP exporter	0.548 [39.78]**	0.604 [26.72]**
Log GDP importer	0.612 [33.61]**	0.61 [18.79]**
Shared border dummy	-0.022 [0.37]	-0.293 [3.05]**
Common language dummy	0.544 [8.16]**	0.781 [7.53]**
Colonial dummy	0.417 [5.27]**	0.437 [3.90]**
STRI exporter	-1.535 [6.51]**	-2.441 [5.49]**
STRI importer	-0.923 [5.22]**	-1.718 [6.12]**
EU pair	0.133 [2.54]*	0.157 [1.71]
Constant	-21.9 [33.0]**	-27.0 [23.9]**
R2	0.28	0.24
N	39232	24977

Source: Frontier Economics' analysis of OECD and CEPII data.

Note: T-statistics in parentheses, significance levels: * $p < 0.05$; ** $p < 0.01$. A specification of the model using only the AV sector was tested, but gave unstable results sensitive to outliers. The results from the pooled model were considered to be more reliable.



CONSUMER SURVEY

Frontier Economics designed an online survey on 1,107 internet users in Australia. The online questionnaires were conducted by Kantar between 29th September and 20th October 2021.

Quotas were set to ensure the sample of respondents for each market was nationally representative by age between 18 and 75, and by gender. Table 2 below shows the number of respondents by age group and gender.

Where a results from the survey is used in the White Paper, the question, possible responses and base is included in the end notes.

TABLE 2 BREAKDOWN OF RESPONDENTS FOR EACH AGE CATEGORY AND GENDER

VALUE	TOTAL	18-24	25-34	35-44	45-54	55-65	66-75	MALE	FEMALE	PREFER NOT TO SAY
Responses	1,107	190	190	175	173	197	182	571	527	9
% of total	100%	17%	17%	16%	16%	18%	16%	52%	48%	1%

Note: Rounding of proportions (%) may mean that components do not sum to 100%.

Source: Frontier Economics' Consumer Survey Results

A blue square icon containing a white film camera on a tripod.

CONTENT CATALOGUE ANALYSIS

Frontier Economics analysed the catalogues of Video on-demand (VOD)⁸ services available to watch in ten markets. This analysis researched the relationship between the number of VOD “original” titles by market and VOD subscriptions across markets.

Data was provided by Ampere Analysis and Media Partners Asia on all audiovisual (AV) content titles that were available to watch on online streaming services between June 2017 and April 2020, as well as an additional set of titles that were only available in October 2020 in Indonesia.⁹ The majority of data is pre-pandemic. Pre-pandemic data has been used because of the uneven impact of the pandemic on AV industries across the world.

The data included VOD “original” titles and licensed content available via the following VOD streaming services: Netflix (18% of titles), Amazon Prime Video (18%), Hotstar (7%), Wavve (7%), Foxtel Now (6%), iflix (5%), Eros Now (5%), WatchaPlay (4%), HamiVideo (4%), Hooq (4%), Claro Video (3%), friDay (3%), myVideo (3%), myVideo (2%), Looke (2%), SonyLiv (2%), VIU (1%). Others (inc. Globo Play, CraveTV, Vidio, Stan, Disney+, Apple TV+ and Crunchyroll – 10%). Data was cleaned to omit duplicate titles across VOD services.

The unique titles included are only those that were available to watch on the listed services within the following markets: Argentina, Australia, Brazil, Canada, Colombia, India, Indonesia, Korea, Mexico and Taiwan.

Unique titles were considered to be any individual piece of content such as a unique movie. Each series of a TV show is considered a unique title.

The dataset contained, for each title, information on the date the title was available, initial production date, information on whether the title was a VOD “original” production, primary production company and primary production market.

The primary production market was recorded as the market in which the unique title was mainly produced or financed as reported by the primary production company. Where this was not possible, the primary

⁸ The term Video on-demand (VOD) refers to professional and curated online video content and does not include user-generated platforms such as YouTube. Alternative terms can be used to describe Video on-demand services, including Direct-to-Consumer (DTC) and online curated content (OCC).

⁹ Due to data limitations, an accurate sample for Indonesia was only available from October 2020. Overall, this still reflects pre-pandemic production data for the country due to the restrictions imposed globally which impacted productions between April to October 2020. In addition, due to production timelines and time between production and release, this data still represents investments made before April 2020.

production market was recorded as the location where the primary production company was based.¹⁰ This can be used to indicate where the content was produced.¹¹

Given that the data includes VOD titles available between June 2017 and April 2020, and in October 2020 in Indonesia, recent content production investments by VOD services are not captured if they had not been released in the window that the sample catalogue data covers.

TABLE 3 SUMMARY STATISTICS OF CATALOGUE SAMPLE

STATISTIC	DATA
Total Unique Titles in Sample	118,405
VOD “original” titles - Total	3,617
VOD “original” titles produced in Australia	61

Source: Frontier Economics’ Catalogue Sample, Ampere Analysis, Media Partners Asia

¹⁰ The information on the primary production market may be overweighted towards the US. This is because production firms may be based or have offices in the US, they may under record where the title was actually mainly produced and there may be a bias to recording the US as primary production market in marginal situations where investments were split between the US and another market. Nevertheless, this catalogue data provides a good indication of where VOD providers have invested in content, as for the majority of titles the primary production market will be accurate.

¹¹ The data was collected from two sources. The majority of the catalogue is based on data collected from Ampere Analysis, using Ampere’s method to assign primary production markets. This catalogue was supplemented with additional titles data from Media Partners Asia. Duplicates across the datasets were removed. Additionally, a set of titles that were available in October 2020 in Indonesia, collected from Media Partners Asia, were included.

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