Online Appendix A. List of 304 Netflix Titles

1 Chance 2 Dance	*Black Mirror*	*Fat, Sick & Nearly Dead*
12 Monkeys	*Black Sails*	*Fat, Sick & Nearly Dead 2*
17 Again	*Bloodline*[*]	*Fed Up*
2001: A Space Odyssey	*Blue Mountain State*	*Ferris Bueller's Day Off*
300	*Bo on the Go!*	*Finders Keepers*
6 Years	*BoJack Horseman*[*]	*Flushed Away*
A Clockwork Orange	*Breaking Bad*	*Forensic Files*
A Very Murray Christmas[*]	*Broadchurch*	*Forrest Gump*
Advantageous	*Brooklyn Nine-Nine*	*Fresh Meat*
After Porn Ends	*Bunks*	*Full Metal Jacket*
Aileen Wuornos: The Selling of a Serial Killer	*Call Me Lucky*	*Gangster Squad*
Aileen: Life and Death of a Serial Killer	*Catch Me If You Can*	*Get Smart*
Akame ga Kill!	*Charlie and the Chocolate Factory*	*Going Clear: Scientology and the Prison of*
American Beauty	*Chasing Ice*	*Gotham*
Anatomy of a Love Seen	*Chef's Table*[*]	*Grace and Frankie*[*]
Angry Birds Toons	*Chicken Run*	*Gravity*
Animal Mechanicals	*Chris Tucker Live*[*]	*Grease*
Anthony Jeselnik: Thoughts and Prayers[*]	*Circle*	*Green Lantern*
Antz	*Clash of the Titans*	*Gunslinger Girl*
Archer	*Club de Cuervos*[*]	*Hall Pass*
Argo	*Collateral*	*Halo 4: Forward Unto Dawn*
Arrow	*Coming to America*	*Happy Feet*
Ascension	*Creep*	*Happy Feet Two*
Atari: Game Over	*DMT: The Spirit Molecule*	*Happy Tree Friends*
Aziz Ansari: Buried Alive[*]	*Danger Mouse*	*He's Just Not That Into You*
Back in Time	*Dark Shadows*	*Heartland*
Bad Night	*Dawg Fight*	*Hemlock Grove*[*]
Bates Motel	*Derek*[*]	*Heropanti*
Batman Begins	*Dinosaur Train*	*Hinterland*
Beasts of No Nation[*]	*Doctor Who*	*Horrible Bosses*
Being Elmo: A Puppeteer's Journey	*Elementary*	*Hot Girls Wanted*[*]
Best of Enemies	*Elf*	*How to Get Away with Murder*
Better Call Saul	*Ever After High*[*]	*How to Train Your Dragon*
Between[*]	*Expelled*	*Hum Aapke Hain Koun*

I Am Legend	*Megamind*	*Puss in Boots*
Iliza Shlesinger: Freezing Hot[*]	*Miss Fisher's Murder Mysteries*	*Radio Rebel*
Inception	*Mission Blue*[*]	*Rake*
Indiana Jones and the Kingdom of the Crystal Skull	*Mission: Impossible - Ghost Protocol*	*Rango*
Iris	*Mission: Impossible II*	*Ray Donovan*
Jane the Virgin	*Mission: Impossible III*	*Real Rob*
Jen Kirkman: I'm Gonna Die Alone (And I Feel Fine)[*]	*Mitt*[*]	*Residue*
Joe Rogan: Live	*Monsters vs Aliens*	*Results*
John Mulaney: The Comeback Kid[*]	*My Babysitter's a Vampire*	*Rhymes for Young Ghouls*
Joseph: King of Dreams	*My Little Pony: Equestria Girls*	*Richie Rich*[*]
Journey 2: The Mysterious Island	*My Little Pony: Friendship Is Magic*	*River*[*]
Journey to Le Mans	*MythBusters*	*Rubble Kings*
Keith Richards: Under the Influence[*]	*Naomi and Ely's No Kiss List*	*Rurouni Kenshin*
Kevin Hart: Let Me Explain	*Narcos*[*]	*Rush Hour 3*
Kung Fu Panda 2	*New Year's Eve*	*Russell Brand: End the Drugs War*
Kurt & Courtney	*No Reservations*	*Russell Peters: Notorious*[*]
Last Days in Vietnam	*No Strings Attached*	*Saving Private Ryan*
Life's Too Short	*Ocean's Eleven*	*Scooby-Doo*
Lilyhammer[*]	*Ocean's Thirteen*	*Scream*[*]
Line of Duty	*Ocean's Twelve*	*Sense8*[*]
Little Witch Academia	*Oggy and the Cockroaches*	*Sex and the City 2*
Living on One Dollar	*Orange Is the New Black*[*]	*Shadowhunters*[*]
Luther	*Over the Hedge*	*Shahid*
Madagascar	*Pacific Rim*	*Shark Tale*
Madagascar 3: Europe's Most Wanted	*Peaky Blinders*	*Sharknado*
Maine Pyar Kiya	*Pee-wee's Playhouse*	*Sharknado 2: The Second One*
Making a Murderer[*]	*Peg + Cat*	*Sherlock Holmes*
Man of Steel	*Penny Dreadful*	*Sherlock Holmes: A Game of Shadows*
Man on Fire	*Peppa Pig*	*Shrek*
Manson Family Vacation	*Piku*	*Shrek 2*
Marco Polo[*]	*Pirate's Passage*	*Shrek Forever After*
Marco Polo: One Hundred Eyes[*]	*Pretty Little Liars*	*Shrek the Halls*
Marvel's Daredevil[*]	*Project X*	*Shutter Island*
Marvel's Jessica Jones[*]	*Puffin Rock*[*]	*Sid the Science Kid*
Master of None[*]	*Pumping Iron*	*Sinbad: Legend of the Seven Seas*

Skins	*The Hunting Ground*	*Top Boy*
*Some Assembly Required**	*The IT Crowd*	*Top Gun*
Somm	*The Inbetweeners*	*Trailer Park Boys**
Soul Eater	*The Last Song*	*Trailer Park Boys: Say Goodnight to the Bad Guys*
Space Racers	*The Lord of the Rings: The Fellowship of the Ring*	*Transformers Prime*
Spartacus	*The Lord of the Rings: The Return of the King*	*Transformers: Dark of the Moon*
Special Ops Mission	*The Lord of the Rings: The Two Towers*	*Transformers: Rescue Bots*
Spirit: Stallion of the Cimarron	*The Lucky One*	*Transformers: Revenge of the Fallen*
Star Trek	*The Magic School Bus*	*Twinsters*
Staten Island Summer	*The Matrix*	*Two Weeks Notice*
Strawberry Shortcake	*The Matrix Reloaded*	*Unbreakable Kimmy Schmidt**
Suits	*The Matrix Revolutions*	*Under the Dome*
Super High Me	*The Mind of a Chef*	*Utopia*
Superman Returns	*The Nightmare*	*Vexed*
Swearnet: The Movie	*The Notebook*	*Video Game High School*
That '70s Show	*The One I Love*	*Virunga**
The 100	*The Originals*	*W/ Bob & David**
*The Battered Bastards of Baseball**	*The Polar Express*	*Wakfu*
The Blacklist	*The Prince of Egypt*	*We're the Millers*
The Bletchley Circle	*The Propaganda Game*	*Weeds*
The Chosen	*The Returned**	*Wentworth*
The Covenant	*The Ridiculous 6**	*Wet Hot American Summer*
The Dark Knight Rises	*The Road to El Dorado*	*What Happened Miss Simone?**
The Delivery Man	*The Search for General Tso*	*Wild Kratts*
The Dictator	*The Shining*	*Winter on Fire: Ukraine's Fight for Freedom**
The Driver	*The Short Game**	*Winx Club*
The Fall	*The SpongeBob SquarePants Movie*	*Wrath of the Titans*
The Fluffy Movie	*The Terminal*	*Yes Man*
The Godfather	*The Town*	*Zapped*
The Great Gatsby	*The True Cost*	*Zeitgeist: Addendum*
The Hangover	*Tig**	*Zeitgeist: Moving Forward*
The Hangover: Part II	*Timmy Time*	
The Hangover: Part III	*To Kill a Mockingbird*	

* Netflix originals.

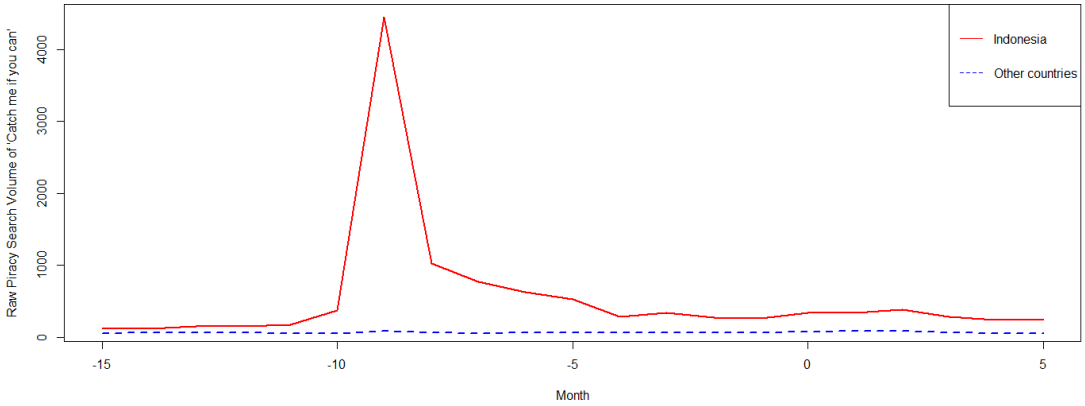
Online Appendix B. Robustness Check of Synthetic Control Method Using 304 Titles

Two titles, *Catch Me If You Can* and *Piku*, were dropped from the main analysis because of serious anomalies in search data, as shown in Figure B.1. Notably, in April 2015 ($t = -9$ in Figure B.1), a South Korean pop band named Girls' Generation (also known as SNSD) released a massively successful song called "Catch Me If You Can" (Benjamin 2015), which contaminated the search volume for the movie with the same name in most East Asian and Southeast Asian countries. We also find substantially different piracy demand for *Piku* in only one country (India), which is where it was produced.

In this appendix, we report the results from the synthetic control method using data of 304 titles, which includes *Catch Me If You Can* and *Piku*. Table B.1 and Table B.2 report the weight allocation across control countries and the pretreatment fit. We also create the trend and gap plots of piracy search volume between the actual Indonesia and the synthetic Indonesia in Figure B.2. The mismatch in piracy search volume from $t = -10$ to $t = -5$ is likely due to abnormal search volume in *Catch Me If You Can* and *Piku* during this period. The average posttreatment gap estimate using 304 titles is 0.196, which is similar to what we found in the main analysis, suggesting the robustness of our findings with respect to the drop of outliers. The post-/pretreatment MSPE ratio for Indonesia is 8.26, which ranks 1 out of 41, suggesting a p-value of 0.024.

Figure B.1. Piracy Search Volume of *Catch Me If You Can* and *Piku*

(a) Search for *Catch Me If You Can* between Indonesia and the Mean of Other Countries



(b) Search for *Piku* between India and the Mean of Other Countries

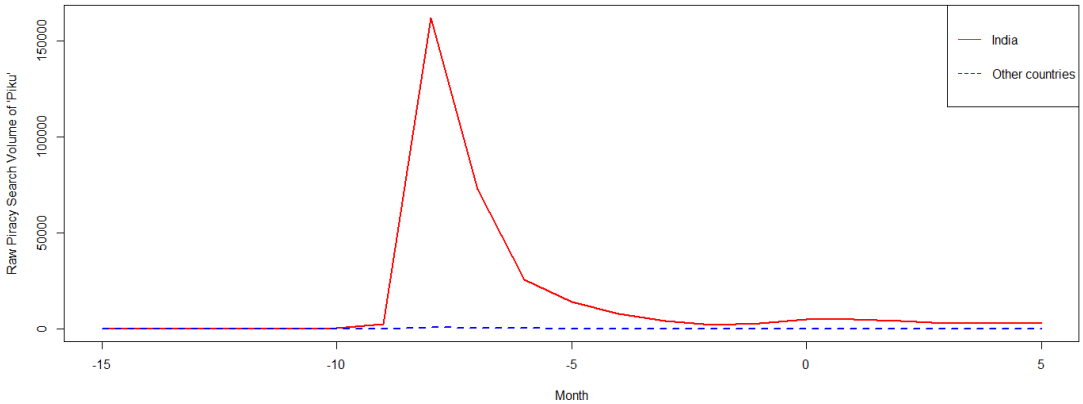


Figure B.2. Trends and Gaps in Piracy Search Using 304 Titles: Indonesia vs. Synthetic Control

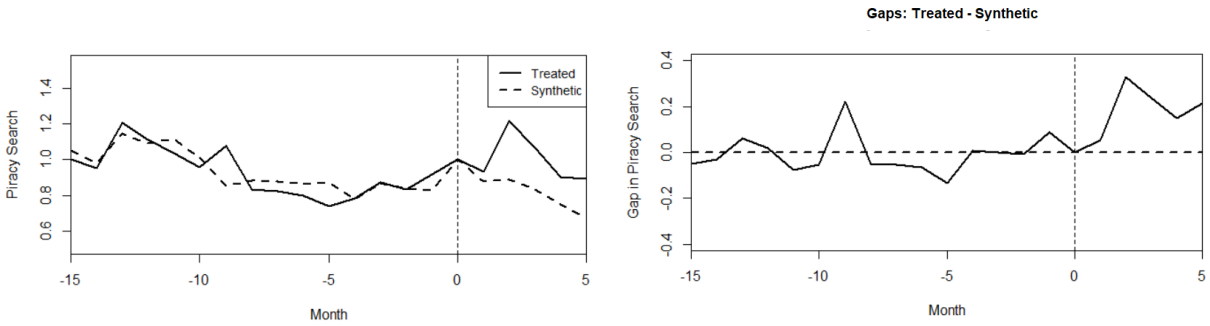


Table B.1. Country Weights in the Synthetic Indonesia Using 304 Titles

Country	Weight	Country	Weight	Country	Weight
Afghanistan	-	Laos	-	South Korea	-
Armenia	-	Macau	-	Sri Lanka	-
Azerbaijan	-	Malaysia	0.236	Taiwan	-
Bahrain	-	Maldives	-	Tajikistan	-
Bangladesh	-	Mongolia	-	Thailand	0.244
Bhutan	-	Myanmar	-	Timor-Leste	-
Brunei	-	Nepal	-	Turkey	-
Cambodia	-	Oman	-	Turkmenistan	-
Hong Kong	-	Pakistan	-	United Arab Emirates	-
India	0.038	Palestine	0.381	Uzbekistan	-
Iraq	-	Philippines	0.101	Vietnam	-
Kazakhstan	-	Qatar	-	Yemen	-
Kuwait	-	Saudi Arabia	-		
Kyrgyzstan	-	Singapore	-		

Table B.2. Mean of Pretreatment Characteristics Using 304 Titles

	Indonesia		Average of 40 Control Countries
	Real	Synthetic	
Piracy Search Volume	0.930	0.938	1.054
Title Search Volume	474,110	373,181	206,196
Interest in Netflix	89,067	64,589	39,154
Interest in General Piracy	92,637	111,212	77,831
Interest in Competitors	37,726	37,057	14,138
Internet Users (2014)	43,627,401	24,325,676	15,332,347
Internet Users (2015)	50,083,428	30,395,634	19,182,586

Online Appendix C. Additional DiD Specifications and Model-Free Evidence

C.1. Alternative presentations and specifications of the DiD Model

We report several two-by-two, diff-in-diff style tables as alternative presentations of the data. We report the level of piracy search volume in raw, normalized, and logged values in Tables C.1-C.3, where highlighted cells present the DiD estimates. All three tables indicate that there is an increase in piracy search volume in Indonesia after the treatment, relative to the other 40 countries where Netflix entered and remained available, suggesting the robustness of our findings to alternative specifications of the DiD model.

C.2. Additional model-free evidence from individual control markets

We present additional model-free evidence for the treatment effect. Specifically, we

1) compare the fit between Indonesia and each control market,
2) plot trend comparisons between Indonesia and each of the 40 control countries to visualize the treatment effect,
3) estimate the size of the treatment effect between Indonesia and each control market.

To make this analysis meaningful across countries of different sizes, we focus on the normalized piracy search volume so that they are on the same scale. This allows us to compare the quality of fit between each country and Indonesia to quantitatively see which countries have the most similar time series.

C.2.1. *Pretretment fit by countries.* We report the pretreatment MSPE across 40 control countries in Figure C.1. We also include the pretreatment MSPE for the synthetic Indonesia (42.7% of Thailand + 37.9% of Palestine + 11.6% of Philippines + 7.7% of India; *Indonesia_SC* on the Y-axis) and the control that assigns equal weight to 40 countries (*Indonesia_DiD* on the Y-axis). The pretreatment MSPE of a control country *i* is calculated as $MSPE_i = \frac{1}{15}\sum_{t=-15}^{-1}\left(\bar{y}_{it} - \bar{y}_{jt}\right)^2$, where $\bar{y}_{it}$ and $\bar{y}_{jt}$ are the mean-centered monthly normalized piracy search for the control and the treated country respectively. A smaller MSPE indicates a better pretreatment fit.

Two observations are noteworthy. First, the synthetic control method leads to a control country that fits Indonesia 27.5% better than the control with equal weights used in the DiD (1-0.0037/0.0051=0.275). Second, using an individual country as the control fits Indonesia strictly worse (greater pretreatment MSPE) than the synthetic Indonesia except for one country, Thailand. The reason the synthetic Indonesia has a larger MSPE than Thailand is because we included several other matching characteristics in the synthetic control matching, as recommended by the literature (Abadie et al. 2010, 2015). Nevertheless, the largest weight on Thailand in the synthetic Indonesia provides some external validity to the synthetic control method.

We classify the 40 control countries into 4 groups based on their pretreatment fit with Indonesia:

1. 3 countries (Thailand, Malaysia, Brunei) whose pretreatment MSPE ≤ 0.005 are classified to the "best fitting" control group;
2. 7 countries (United Arab Emirates, Oman, Palestine, Maldives, Taiwan, Kazakhstan, Hong Kong) remain in the top quartile of fit;
3. 10 countries (Cambodia, Pakistan, Saudi Arabia, Azerbaijan, Bahrain, Sri Lanka, Kuwait, Qatar, Bangladesh, Nepal) fall into the second quartile;
4. 20 countries (Iraq, India, Armenia, Myanmar, South Korea, Uzbekistan, Turkey, Philippines, Mongolia, Vietnam, Yemen, Singapore, Macau, Afghanistan, Laos, Tajikistan, Kyrgyzstan, Bhutan, Turkmenistan, Timor-Leste) fall into the bottom half of fit. These countries generally have a very poor fit with Indonesia.

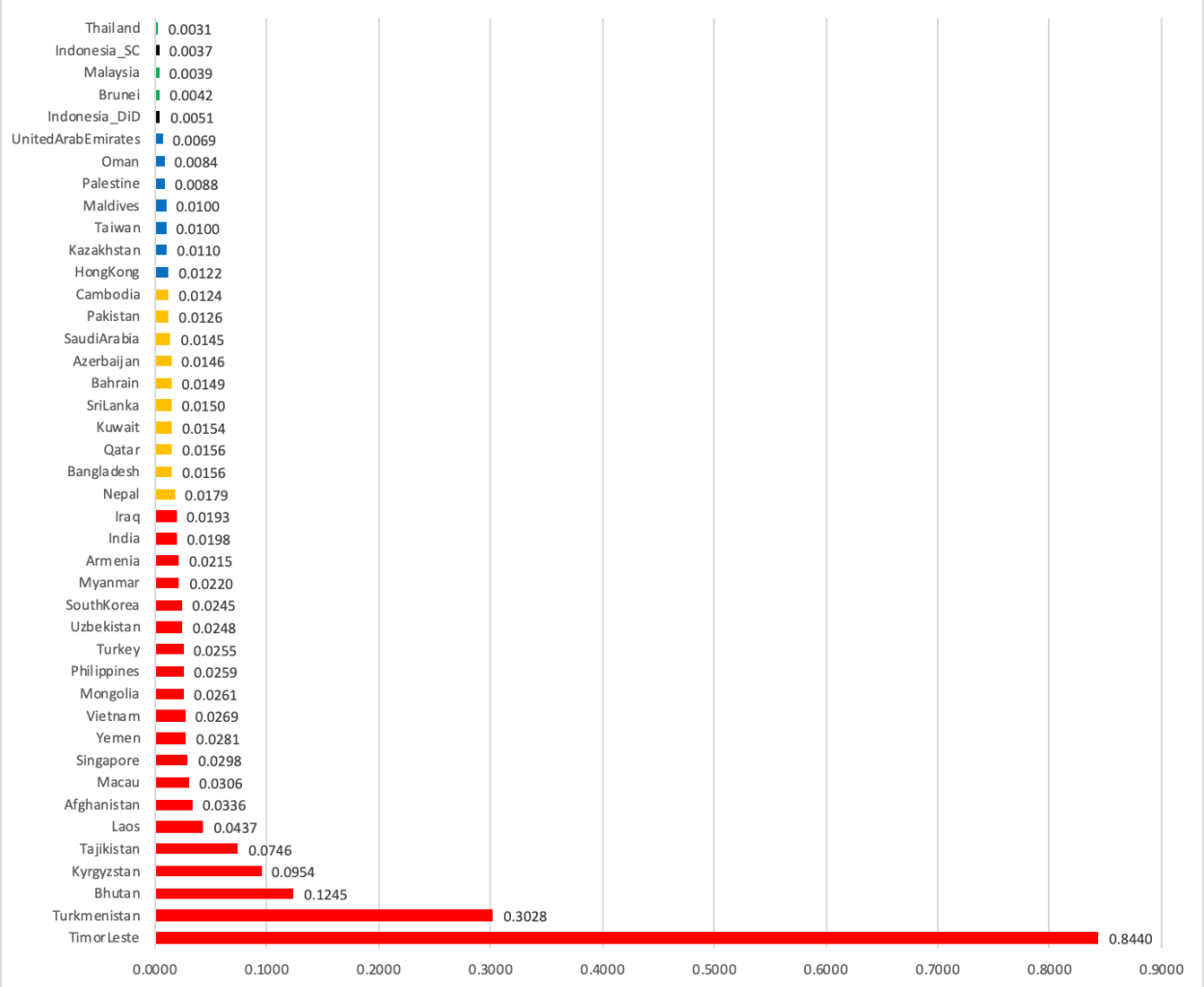
C.2.2. *Trend comparisons*. We present the trend comparison between Indonesia and the three best fitting control countries in Figure C.2. To better visualize whether the parallel trend is likely to exist, we mean shift the normalized piracy search of the control country so that the first month's ($t = -15$) gap between the control and Indonesia is zero.

The parallel trend assumption seems to hold well in Thailand, Malaysia, and Brunei because of the relatively small pretreatment gaps. For these three countries, we observe a clearly positive posttreatment gap, which provides model-free evidence for the positive treatment effect of Netflix's unavailability in Indonesia.

For the remaining control countries in the top quartile, we observe a generally positive posttreatment gap only in some countries (United Arab Emirates, Palestine, Taiwan, Hong Kong). However, the parallel trend assumption is unlikely to hold in any of these countries after inspecting the pretreatment trends between Indonesia and the control country. Our observations of the parallel trend in countries outside of the top quartile show a generally poor fit. This suggests that a synthetic control model may do a better job of matching pieces of regions.

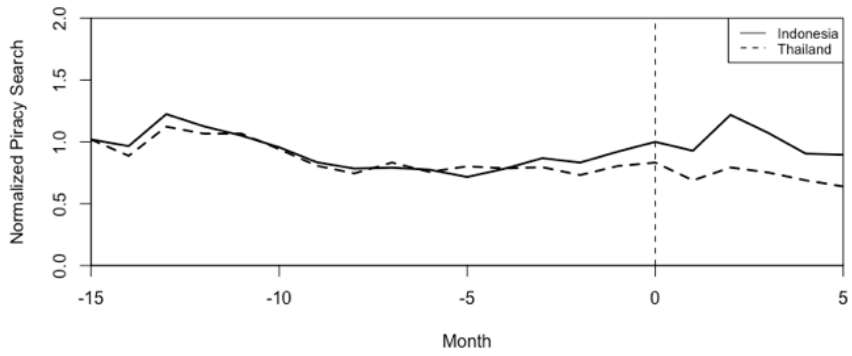
C.2.3. *DiD estimates by countries.* We further investigate the treatment effect when using each of the 40 countries as the control. Several findings emerge from the DiD estimates reported in Table C.4. First, the majority of DiD estimates are positive and none of negative estimates are statistically significant. This suggests that the change in piracy search in Indonesia after the treatment is greater than in most control countries. Second, despite the small sample size (40 observations in each DiD regression), more than half (21 of 40) of the DiD estimates are positive and statistically significant at 0.10, and 45% (18 of 40) are statistically significant at 0.05; and all DiD estimates are significant at 0.10 if we focus on the best fitting control countries. Third, among the 21 statistically significant DiD estimates ($p < 0.10$), the effect size is always greater than the 19.7% increase found from the synthetic control method, with the exception of the 19.6% effect size from using Palestine as the control. This observation implies that the treatment effect from synthetic control method may be conservative. In sum, the DiD estimates using each individual country as the control provides additional evidence for the positive treatment effect.

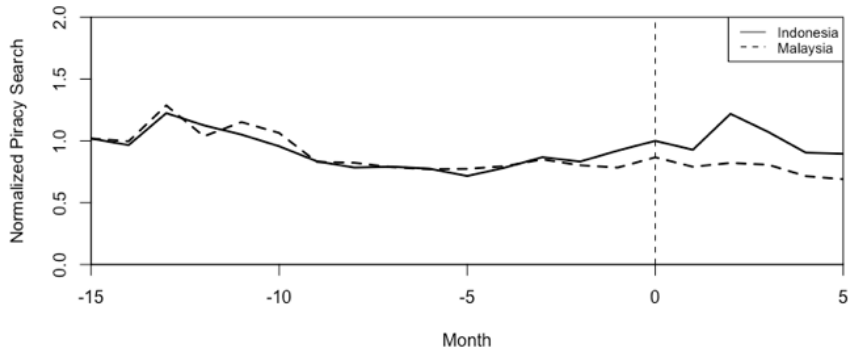
Figure C.1. Pretreatment MSPE across Countries



Notes. **Black**: synthetic Indonesia and the control used in the DiD model; **Green**: best fitting control countries with pretreatment MSPE $\leqslant 0.005$; **Blue**: remaining control countries in the top quartile of fit; **Yellow**: countries in the second quartile of fit.; **Red**: countries in the bottom half of fit.

Figure C.2. Trend Comparisons for the Three Best Fitting Control Countries





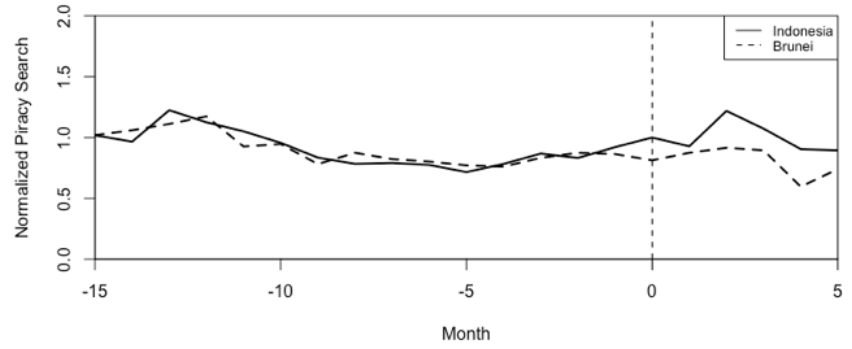


Table C.1. Raw Piracy Search Volume between Indonesia and Control Countries before and after the treatment

Raw piracy search volume	Pretreatment $(-15 \leq t \leq -1)$	Treatment $(t = 0)$	Posttreatment $(1 \leq t \leq 5)$	Difference (post–pre)
Indonesia (treated)	15393 (2469)	16920 (·)	16984 (2368)	1591
40 Asian countries (control)	4634 (9841)	4875 (11728)	4426 (10427)	–207
Difference (treated–control)	10759	-	12558	**1799**

Notes. Standard deviation in parentheses.

Table C.2. Normalized Piracy Search Volume between Indonesia and Control Countries before and after the treatment

Normalized piracy search volume	Pretreatment $(-15 \leq t \leq -1)$	Treatment $(t = 0)$	Posttreatment $(1 \leq t \leq 5)$	Difference (post–pre)
Indonesia (treated)	0.910 (0.146)	1.000 (·)	1.004 (0.140)	0.094
40 Asian countries (control)	1.036 (0.315)	1.000 (0)	0.951 (0.263)	–0.085
Difference (treated–control)	–0.126	-	0.053	**0.179**

Notes. Standard deviation in parentheses.

Table C.3. Log of Piracy Search Volume between Indonesia and Control Countries before and after the treatment

Log of piracy search volume	Pretreatment $(-15 \leq t \leq -1)$	Treatment $(t = 0)$	Posttreatment $(1 \leq t \leq 5)$	Difference (post–pre)
Indonesia (treated)	9.630 (0.155)	9.736 (·)	9.733 (0.134)	0.103
40 Asian countries (control)	7.176 (1.695)	7.182 (1.726)	7.086 (1.738)	–0.090
Difference (treated–control)	2.454	-	2.647	**0.193**

Notes. Standard deviation in parentheses.

Table C.4. DiD Estimates Using an Individual Country as the Control

Group	Control country	Pretreatment MSPE	DiD Estimates
Best fitting countries (3 countries)	Thailand	0.0031	0.259 (0.097) **
	Malaysia	0.0039	0.247 (0.106) **
	Brunei	0.0042	0.198 (0.101) *
Rest of top quartile of control countries (7 countries)	United Arab Emirates	0.0069	0.218 (0.088) **
	Oman	0.0084	0.059 (0.083)
	Palestine	0.0088	0.196 (0.096) **
	Maldives	0.0100	0.110 (0.101)
	Taiwan	0.0100	0.225 (0.088) **
	Kazakhstan	0.0110	0.216 (0.094) **
	Hong Kong	0.0122	0.200 (0.086) **
Second quartile of control countries (10 countries)	Cambodia	0.0124	0.137 (0.087)
	Pakistan	0.0126	0.264 (0.090) ***
	Saudi Arabia	0.0145	0.213 (0.100) **
	Azerbaijan	0.0146	0.216 (0.106) **
	Bahrain	0.0149	0.140 (0.093)
	Sri Lanka	0.0150	0.015 (0.088)
	Kuwait	0.0154	0.140 (0.087)
	Qatar	0.0156	0.216 (0.095) **
	Bangladesh	0.0156	-0.101 (0.085)
	Nepal	0.0179	-0.074 (0.086)
Bottom half of control countries (20 countries)	Iraq	0.0193	0.029 (0.083)
	India	0.0198	0.007 (0.080)
	Armenia	0.0215	0.280 (0.101) ***
	Myanmar	0.0220	-0.105 (0.101)
	South Korea	0.0245	0.270 (0.142) *
	Uzbekistan	0.0248	-0.074 (0.133)
	Turkey	0.0255	0.333 (0.114) ***
	Philippines	0.0259	0.195 (0.152)
	Mongolia	0.0261	0.473 (0.153) ***
	Vietnam	0.0269	0.263 (0.121) **
	Yemen	0.0281	-0.160 (0.135)
	Singapore	0.0298	0.381 (0.158) **
	Macau	0.0306	0.281 (0.133) **
	Afghanistan	0.0336	0.279 (0.142) *
	Laos	0.0437	0.205 (0.143)
	Tajikistan	0.0746	0.419 (0.165) **
	Kyrgyzstan	0.0954	0.220 (0.174)
	Bhutan	0.1245	0.201 (0.197)
	Turkmenistan	0.3028	0.461 (0.325)
	Timor-Leste	0.8440	0.094 (0.451)

Notes. Standard errors in parentheses. $N = 40$ in each DiD regression.
*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Online Appendix D. Additional Investigations of Model Assumptions and Results

D.1. Further investigation of potential cross-country spillover effects

Cross-country effects may occur if people in Indonesia read news from foreign countries and spread WOM to affect piracy search behavior of others. We provide two pieces of empirical evidence which suggest that this was unlikely or not substantial.

First, we identify popular websites where Indonesians obtain information about TV shows and movies. To do so, we used SimilarWeb and the Wayback Machine to identify the top 50 most visited websites in Indonesia in July 2017, the earliest record available.[1] We find that the top 50 websites in the media, news, and entertainment categories are all local Indonesian websites (detik.com, kompas.com, uzone.id, tribunnews.com, liputan6.com, kapanlagi.com) with the exception of YouTube, an international website. Therefore, we fail to find evidence that Indonesians predominantly visit entertainment websites from other Asian countries.

Second, we examine the popularity of mainstream newspaper and TV channels in the four control countries that constitute the synthetic Indonesia during the posttreatment period. We compare the search volume of the most read (viewed) newspaper (TV channels) in each of the four control countries with that of the most read (viewed) newspaper (TV channels) in Indonesia using Google Trends. For newspapers, the most circulated newspaper in Indonesia and the four control countries are Kompas (Indonesia), Dainik Bhaskar (India), Philippines Daily Inquirer (the Philippines), VnExpress (Thailand), and Al-Quds (Palestine). For TV channels, the most prominent local TV channels are ANTV (Indonesia), Sun TV (India), ABS-CBN (the Philippines), 7 HD (Thailand), and Al-Aqsa TV (Palestine). We report the head-to-head comparison of search volumes on Google in Figure D.1 and Figure D.2. The flat curves of search volume of the mainstream news media and TV channels from the four control countries indicate that these foreign media sources were rarely searched for by Indonesians during the posttreatment period, which again does not support the existence of spillovers of WOM across countries.

D.2. Consideration of cross-country price variation

If Netflix charged a higher price in certain countries than others, the substitution between piracy and paid content would be different across countries, and therefore renders the Netflix' service to be incomparable. To investigate the extent of price variation, we collected data on prices for the basic subscription offered by Netflix in each of the four synthetic control countries (India[2], Palestine[3], the Philippines[4], Thailand[5]) during the posttreatment window. We find that the basic subscription of Netflix across these countries costs between $7 and $8 a month using the currency rates in January 2016, suggesting a relatively small price variation across countries.

We also find a webpage listing Netflix prices in July 2017 around the world (Baker 2017). The most common price for the basic Netflix subscription was $7.99 USD, especially among Asian countries. This observation provides further evidence for the small price variation across countries in this study. We also did not find any evidence for price changes in India, Palestine, the Philippines, and Thailand during the posttreatment period.

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[1] https://web.archive.org/web/20170713085424/https://www.similarweb.com/top-websites/indonesia
[2] https://gadgets.ndtv.com/tv/news/netflix-launched-in-india-plans-start-at-rs-500-per-month-786529
[3] https://bit.ly/3ael0v1. We searched for "Netflix price Palestine" in Google and sets the date range from January 1 to January 31, 2016. The snippet from Netflix's web page in Palestine suggests that the price of basic Netflix subscription in Palestine was 7.99 USD in January 2016.
[4] https://cnnphilippines.com/entertainment/2016/01/07/Netflix-Philippines-prices-Netflix-Everywhere-TV-series-movies-streaming.html
[5] https://www.bangkokpost.com/learning/work/818956/netflix-expands-to-thailand

D.3. Discussion of the exclusion of similar countries in the synthetic control group

One possible explanation for the exclusion of similar countries in the control group, such as Malaysia, is that the similarities between Indonesia and Malaysia has already been adequately captured by the relationship between Indonesia and other four countries that constitute the synthetic control group. This is a common occurrence in synthetic control models (e.g., Abadie et al. 2010), and we provide evidence that it is the case here as well by first comparing piracy search in Malaysia to other control countries and then by investigating an alternative synthetic control specification.

Comparing Malaysia to other control countries. Interestingly, the piracy search dynamics in Malaysia is a strong match to the weighted combination of the Philippines and Thailand, which are both members of our synthetic control model. In particular, in Figure D.3 we show the period-by-period comparison between Malaysia and a weighted combination of the Philippines and Thailand. We set the weight to be consistent with the relative importance of the Philippines (11.6%) and Thailand (42.7%) in the synthetic Indonesia (11.6/(42.7+11.6) = 21.4% for the Philippines and 42.7/(42.7+11.6) = 78.6% for Thailand).

As Figure D.3 shows, the temporal variation in piracy search in Malaysia is well captured by the weighted combination of the Philippines and Thailand, both before and after the treatment. This implies that the fit between the synthetic and actual Indonesia will not be substantially improved by the inclusion of Malaysia, conditional on the inclusion of the Philippines and Thailand. This provides support for the absence of Malaysia in the synthetic control group.

Alternative synthetic control model excluding Thailand and the Philippines. An alternative way to approach this question is to remove the overlapping control countries (Thailand and the Philippines) and re-estimate the synthetic control model. If there is indeed a substantial overlap, then Malaysia should have a large weight in the new model. This is precisely what we find.

Excluding both the Philippines and Thailand from the synthetic control model leads to a result where the new synthetic Indonesia places the largest weight on Malaysia (47%), followed by Palestine (45%) and India (3%). This model also places small non-zero weights (between 0.1% and 0.3%) on a subset of other countries. Figure D.4 shows the trend and gap plots of piracy search volume between the actual Indonesia and the synthetic Indonesia. These two plots are similar to the trend and gap plots (Figures 3 and 4 in the article) when the Philippines and Thailand were included in the potential control. The gap estimate of the treatment effect is 0.212, which is also close to the effect size of 0.197 in our main analysis.

A second possible explanation for the exclusion of a country such as Malaysia from the synthetic control group is that although this country shares similarities with Indonesia in many aspects, they are less similar with respect to piracy behavior. Malaysia has a much higher piracy rate (defined as the percentage of population who visited piracy sites) than Indonesia. According to MUSO, Malaysia has a piracy rate almost twice as much as that of Indonesia. We provide further support to this discrepancy between Indonesia and Malaysia using our data on pretreatment piracy search volumes. We create a piracy ranking in 2015 based on average monthly piracy search volume per capita for the Netflix titles in our study. We find that Malaysia is ranked 11th, showing considerably higher piracy search per capita than Indonesia, which is ranked 26th. Thailand is ranked 18th and the Philippines is ranked 28th, showing that the two Southeast Asian countries in the synthetic control group are indeed more similar to Indonesia with respect to online piracy search. It is also worth noting that the correlation between our own piracy ranking and the MUSO's is 0.85 across the 13 Asian countries that are available in MUSO's report, which provides some external validity of this investigation.

D.4. Further discussion of Netflix's short availability in Indonesia

It is theoretically possible that the short availability of Netflix in Indonesia might drive consumers to increase search for piracy in subsequent months because of the generated demand for content. If such a carryover effect of the short operation of Netflix really exists, we expect to see an immediate increase in piracy search in Indonesia after January 2016. However, we actually observe a dip rather than a bump in February 2016 (see Figure 3 at t = 1), which is inconsistent with what the carryover effect predicts. The presence of this carryover effect predicts that the unavailability of Netflix in Indonesia should lead to more piracy search for TV shows rather than movies because TV shows typically include more content (because of multiple episodes and multiple seasons) and therefore are more likely to be consumed over a longer time span. This prediction is again not supported by the data. As Table D.1 shows, the piracy search volume for TV shows actually decreased in February and March 2016, compared to that in January. The data therefore fails to support a potential carryover effect of Netflix's three-week availability in Indonesia, suggesting that the estimate of the treatment effect (Netflix's failure to launch) is unlikely biased by the short operation of Netflix in Indonesia.

D.5. Discussion of posttreatment variations in piracy search in Indonesia

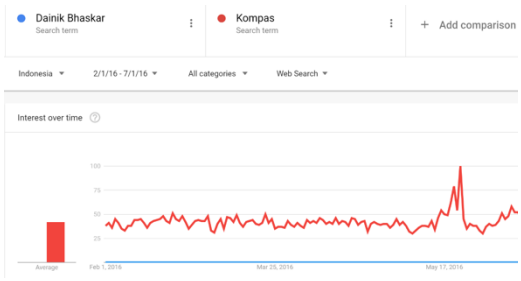
We investigate the spikes in piracy search in Indonesia in March and April 2016. First, we check whether the spikes in these two months are abnormal. The first row in Table D.1 reports the normalized piracy search in Indonesia from January to June 2016. Although the piracy search volume in March and April is 21.9% and 7.3% higher than that of January, we saw a decline in piracy search volume in February (-7.8%), May (-9.6%), and June (-10.5%). In fact, the mean of normalized piracy search in the 5 posttreatment months is 1.004. Thus, the piracy search on average remained the same in Indonesia after the treatment – which is consistent with the null effect in Indonesia due to Netflix's unavailability. As the two spikes in March and April did not lead to a significant increase in piracy search in Indonesia after the treatment, these two spikes do not appear to be outliers.

We also examine whether the 21.9% mean deviation in March 2016 was unprecedented. To check this, we calculate the mean deviation for each month before the treatment by the difference in normalized piracy search and the mean level during the 15 pretreatment months. The range of the mean deviations during the pretreatment period is from -19.4% to 31.5%. In addition, the mean deviations in both December 2014 (31.5%) and January 2015 (21.6%) are either larger or similar to that in March 2016. We therefore conclude that the spike in March 2016 was not unprecedented and should not be excluded from the estimation of the treatment effect.

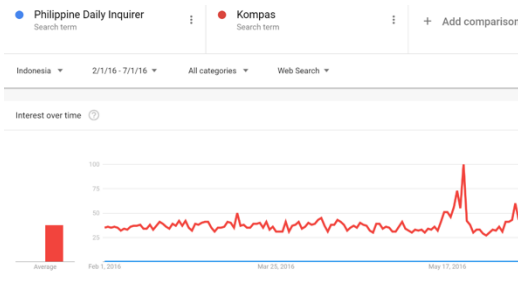
To better understand the potential drivers of the spike, we break down the piracy search volume to that from TV shows and movies (row 2 and row 3 in Table D.1.). We find that the positive demand shock in March 2016 was mainly driven by the demand for movies rather than TV shows. Although we do not have a definitive explanation for why this happened in March 2016, we can speculate that this unobserved positive demand shock for movies was related to the Oscar ceremony, which took place at the end of February (Feb 28th, 2016) and might drive the overall interest in movie consumption in March.

Figure D.1. Comparing Search Volume of Foreign and Local Newspapers in Indonesia

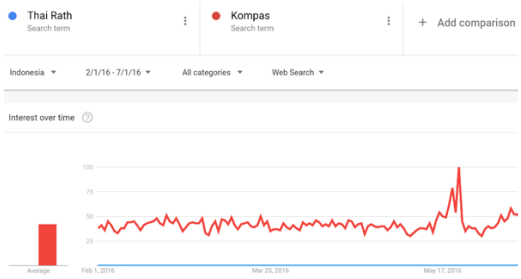
India vs. Indonesia



Philippines vs. Indonesia



Thailand vs. Indonesia



Palestine vs. Indonesia

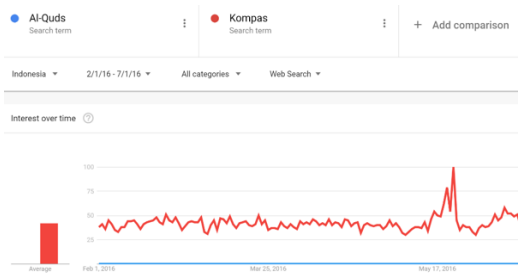
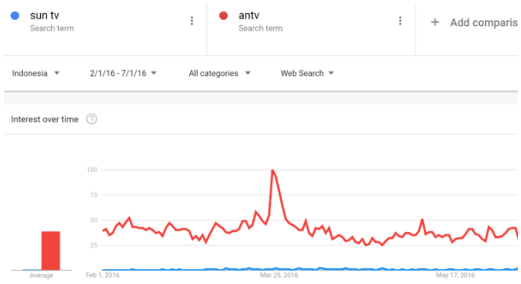
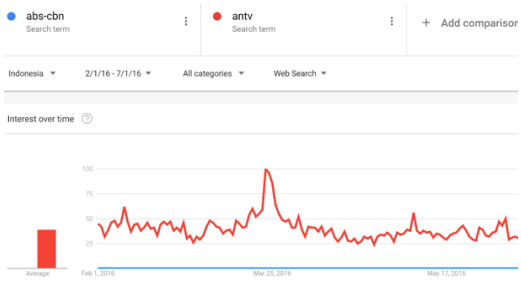


Figure D.2. Comparing Search Volume of Foreign and Local TV Channels in Indonesia

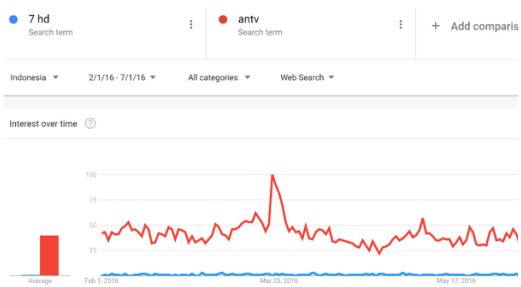
India vs. Indonesia



Philippines vs. Indonesia



Thailand vs. Indonesia



Palestine vs. Indonesia

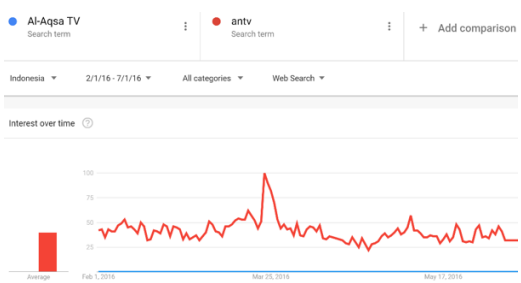


Figure D.3. Trend Comparisons between Malaysia and the Weighted Combination of the Philippines and Thailand

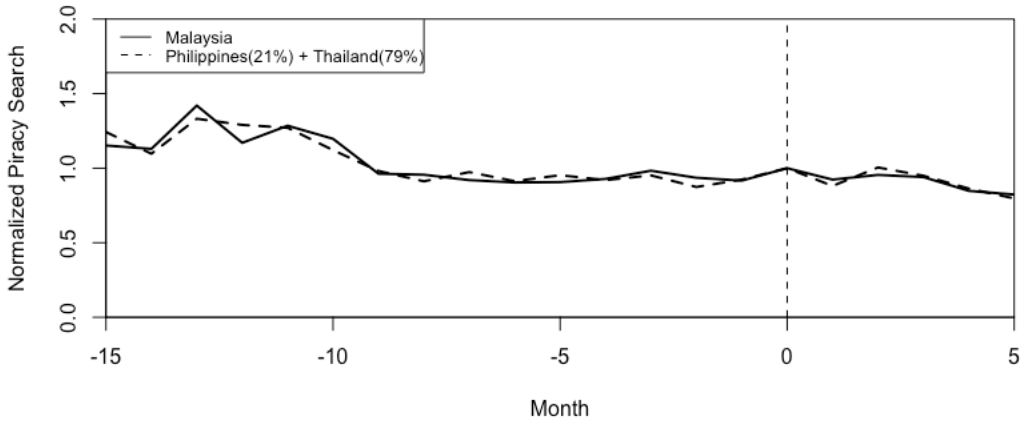


Figure D.4. Trends and Gaps in Piracy Search When Excluding the Philippines and Thailand

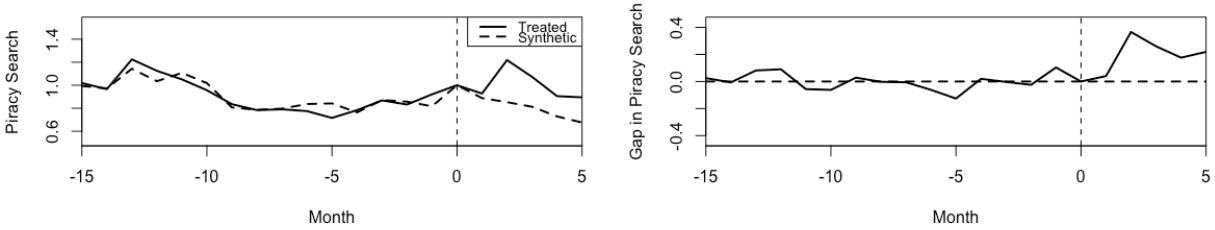


Table D.1. Piracy Search Volume in Indonesia after the Treatment

	Jan 2016	Feb 2016	Mar 2016	Apr 2016	May 2016	Jun 2016
Normalized piracy search	1.000	0.928	1.219	1.073	0.904	0.895
Piracy search volume (TV shows)	4,350	3,960	3,810	4,120	4,030	4,160
Piracy search volume (movies)	12,570	11,740	16,810	14,030	11,280	10,980
Piracy search volume (total)	16,920	15,700	20,620	18,150	15,310	15,410

Online Appendix E. Supplementary Investigations Related to the Substitution and Market Expansion Effects

We first provide empirical support for the theorized stronger substitution effect for original than nonoriginal titles. We then rule out an alternative explanation for the smaller effect for original titles due to the lack of piracy availability. Last, we provide additional evidence for the market expansion effect.

E.1. Assumptions for the stronger substitution effect for original titles

Our argument for the stronger substitution effect for original over nonoriginal titles relies on two implicit assumptions. First, unlike original titles that are exclusively available on Netflix, nonoriginal titles are available on other legal channels. Second, both original and nonoriginal titles are available on piracy sites. Under these two assumptions, we expect a greater substitution effect for original than nonoriginal titles because consumers are only able to consume pirated content for original titles, while they can choose between other legal channels and piracy sites for nonoriginal titles, when Netflix is unavailable.

We empirically verify the first assumption by showing that there were at least two leading DVD rental service providers in Indonesia at the time of this study (2015–2016). Video Ezy, Goal Disc, and DVD Club were the three largest DVD rental service providers in Indonesia in 2011 (Fahriyadi 2011). We find that in 2018, there were 65 Video Ezy stores in Indonesia and Goal Disc was still offering franchise opportunities (Shetty 2018, ThaiFranchiseCenter 2018). It is therefore reasonable to assume that Indonesians were able to consume nonoriginal content through legal channels between 2011 and 2018, which covered period of analysis.

For the second assumption, we manually checked whether there were torrents uploaded before January 27, 2016, to the three popular torrent sites for each of the 302 titles used in the main analysis. Specifically, we focused on the availability of torrents on The Pirate Bay, RARBG, and 1337x, which were popular torrent sites in 2016 that were still live as of November 2019, when we collected data on piracy availability (Ernesto 2016b, 2018). As we inferred piracy availability from archived data from three torrent sites, our measure of piracy availability is conservative, because a pirated copy could have been uploaded to one of these three sites before 2016 and later removed or a pirated copy could have been available on other torrent sites. A search for piracy availability leads to the finding that 287 of the 302 titles (95.03%) had torrent files uploaded to at least one of the three torrent sites before January 27, 2016, suggesting that the second assumption about piracy availability generally holds. The 15 titles that lack piracy availability are largely unpopular titles, as indicated by the relatively small monthly search volume per title per country (215.24) compared with the population mean (1214.67).

E.2. Ruling out an alternative explanation for the smaller effect for original titles

An alternative explanation for the smaller effect of Netflix's unavailability on piracy search for original titles relates to the second assumption about piracy availability discussed in E.1. If most original titles were not available on piracy sites, the unavailability of Netflix would not significantly affect consumers' piracy search for original titles, as consumers likely expected that there was little, if any, piracy supply for original titles. As 10 of the 15 titles that do not have torrents uploaded before January 27, 2016 are Netflix originals, we cannot directly rule out this explanation. If the market expansion, rather than the lack of piracy availability, is the main force driving the smaller effect for original than nonoriginal titles, we expect to find similar effect sizes for original and nonoriginal titles after we exclude these 15 titles without piracy availability from the sample. Following this reasoning, we conducted a robustness check using the sample of 287 titles with piracy availability. The results are qualitatively similar to what we found in the main analysis. The main effect of Netflix's unavailability in Indonesia on piracy search is 0.200. The post-/pretreatment MSPE ratio for Indonesia is 13.44, which ranks 1 out of 41 countries. Table E.1 and Table E.2 report the weight allocations across control countries and the pretreatment fit. The trend and gap plots of piracy search volume between the actual Indonesia and the synthetic Indonesia are

close to Figure 3 and Figure 4, and therefore are omitted. Using a DiD-type method described in Section 5.4.1, the effect for original titles is 0.045 and the effect for nonoriginal titles is 0.240, which are also close to what we found in the main analysis. The results from this robustness check suggest that the smaller effect for original than nonoriginal titles is more likely driven by the existence of market expansion effect than by the lack of piracy supply for original titles.

E.3. Additional evidence for the market expansion effect

We provide further evidence for the market expansion effect by assessing the moderating effect of the release date of original titles. If the introduction of a legal distribution channel can expand the piracy market through increased WOM and promotion, we expect such a market expansion effect to be stronger for more recently released content because the effects of WOM and promotion tend to decay over time (Liu 2006, Sethuraman et al. 2011). To test the moderating effect of the release date, we median-split 49 original titles into two groups according to the release date. The effect size for the newer original titles is 0.030 and the effect size for the older original titles is 0.138 based on the DiD-type method. The smaller effect for newer original titles is consistent with the greater market expansion effect for newer original titles due to more recently created WOM and promotion.

Table E.1. Country Weights in the Synthetic Indonesia Using 287 Titles with Piracy Availability

Country	Weight	Country	Weight	Country	Weight
Afghanistan	-	Laos	-	South Korea	-
Armenia	-	Macau	-	Sri Lanka	-
Azerbaijan	-	Malaysia	-	Taiwan	-
Bahrain	-	Maldives	-	Tajikistan	-
Bangladesh	-	Mongolia	-	Thailand	0.412
Bhutan	-	Myanmar	-	Timor-Leste	-
Brunei	-	Nepal	-	Turkey	-
Cambodia	-	Oman	-	Turkmenistan	-
Hong Kong	-	Pakistan	-	United Arab Emirates	-
India	0.078	Palestine	0.382	Uzbekistan	-
Iraq	-	Philippines	0.129	Vietnam	-
Kazakhstan	-	Qatar	-	Yemen	-
Kuwait	-	Saudi Arabia	-		
Kyrgyzstan	-	Singapore	-		

Table E.2. Mean of Pretreatment Characteristics Using 287 Titles with Piracy Availability

	Indonesia		Average of 40 Control Countries
	Real	Synthetic	
Piracy Search Volume	0.912	0.920	1.035
Title Search Volume	462,396	439,700	196,705
Interest in Netflix	89,067	73,383	39,154
Interest in General Piracy	92,637	181,332	77,831
Interest in Competitors	37,726	37,264	14,138
Internet Users (2014)	43,627,401	33,942,075	15,332,347
Internet Users (2015)	50,083,428	45,443,652	19,182,586

Online Appendix F. Robustness Check of Synthetic Control Method Using 701 Titles

When we consider all 701 titles (excluding *Catch Me If You Can* and *Piku*) that appeared in Indonesia's Netflix catalog in January 2016, the main effect of Netflix's unavailability in Indonesia on piracy search is 0.224. The post-/pretreatment MSPE ratio for Indonesia is 11.47, which ranks 2 out of 41 countries. Table F.1 and Table F.2 report the weight allocation across control countries and the pretreatment fit. Figure F.1 shows the trend and gap plots of piracy search volume between the actual Indonesia and the synthetic Indonesia. Using a DiD-type method described in Section 5.4.1, the effect for original titles is 0.012 and the effect for nonoriginal titles is 0.242. Findings from the main analysis (based on 302 titles) are therefore robust to the consideration of all titles.

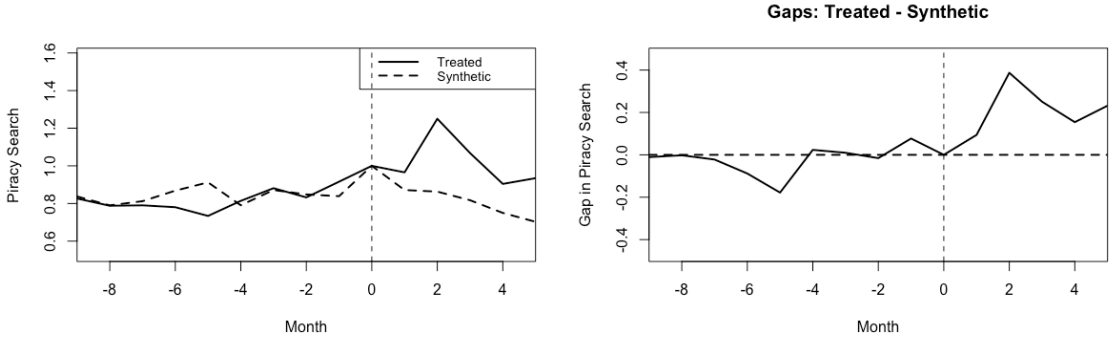
Table F.1. Country Weights in the Synthetic Indonesia Using 701 Titles

Country	Weight	Country	Weight	Country	Weight
Afghanistan	-	Laos	-	South Korea	-
Armenia	-	Macau	-	Sri Lanka	-
Azerbaijan	-	Malaysia	0.313	Taiwan	-
Bahrain	-	Maldives	-	Tajikistan	-
Bangladesh	-	Mongolia	-	Thailand	0.002
Bhutan	-	Myanmar	-	Timor-Leste	-
Brunei	-	Nepal	-	Turkey	0.140
Cambodia	-	Oman	-	Turkmenistan	-
Hong Kong	-	Pakistan	-	United Arab Emirates	-
India	0.039	Palestine	0.432	Uzbekistan	-
Iraq	-	Philippines	0.070	Vietnam	0.001
Kazakhstan	-	Qatar	-	Yemen	-
Kuwait	-	Saudi Arabia	-		
Kyrgyzstan	-	Singapore	-		

Table F.2. Mean of Pretreatment Characteristics Using 701 Titles

	Indonesia		Average of 40 Control Countries
	Real	Synthetic	
Piracy Search Volume	0.910	0.915	1.036
Title Search Volume	468,524	483,786	199,861
Interest in Netflix	89,067	75,841	39,154
Interest in General Piracy	92,637	144,545	77,831
Interest in Competitors	37,726	37,313	14,138
Internet Users (2014)	43,627,401	25,020,500	15,332,347
Internet Users (2015)	50,083,428	30,963,140	19,182,586

Figure F.1. Trends and Gaps in Piracy Search Using 701 Titles



Online Appendix G. Robustness Check Using 292 Titles in Foreign Languages

Table G.1 reports 10 titles in local languages of 41 Asian countries. To ensure that the main findings are not affected by these titles, we apply the synthetic control method to the data of the remaining 292 titles. The results show that piracy search volume is 21.1% higher in Indonesia than in the synthetic control country after Netflix's failure to launch in Indonesia. The post-/pretreatment MSPE ratio for Indonesia is 17.24, which ranks 1 out of 41 countries. Using a DiD-type method described in Section 5.4.1, the effect for original titles is 0.046 and the effect for nonoriginal titles is 0.256. The main findings are therefore not sensitive to the exclusion of these 10 titles.

Table G.1. Titles in Local Languages of 41 Asian Countries

Title	Netflix Original	Language
Akame Ga Kill!	No	Japanese
Gunslinger Girl	No	Japanese
Rurouni Kenshin	No	Japanese
Soul Eater	No	Japanese
Little Witch Academia	No	Japanese
Little Witch Academia: The Enchanted Parade	No	Japanese
Winx Club	No	Hindi
Heropanti	No	Hindi
Hum Aapke Hain Koun	No	Hindi
Maine Pyar Kiya	No	Hindi

Table G.2. Country Weights in the Synthetic Indonesia Using 292 Titles in Foreign Languages

Country	Weight	Country	Weight	Country	Weight
Afghanistan	-	Laos	-	South Korea	-
Armenia	-	Macau	-	Sri Lanka	-
Azerbaijan	-	Malaysia	-	Taiwan	-
Bahrain	-	Maldives	-	Tajikistan	-
Bangladesh	-	Mongolia	-	Thailand	0.407
Bhutan	-	Myanmar	-	Timor-Leste	-
Brunei	-	Nepal	-	Turkey	-
Cambodia	-	Oman	-	Turkmenistan	-
Hong Kong	-	Pakistan	-	United Arab Emirates	-
India	0.088	Palestine	0.409	Uzbekistan	-
Iraq	-	Philippines	0.095	Vietnam	-
Kazakhstan	-	Qatar	-	Yemen	-
Kuwait	-	Saudi Arabia	-		
Kyrgyzstan	-	Singapore	-		

Table G.3. Mean of Pretreatment Characteristics Using 292 Titles in Foreign Languages

	Indonesia		Average of 40 Control Countries
	Real	Synthetic	
Piracy Search Volume	0.880	0.890	1.038
Title Search Volume	442,603	409,854	187,139
Interest in Netflix	89,067	72,903	39,154
Interest in General Piracy	92,637	194,324	77,831
Interest in Competitors	37,726	37,119	14,138
Internet Users (2014)	43,627,401	34,902,230	15,332,347
Internet Users (2015)	50,083,428	47,496,300	19,182,586

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