

Online Appendix  
Incomplete Contracts and Future Data Usage

November 2022

# Proof of Proposition 1

*Proof:*

Assume that  $S_f > S_c$ . If parties allocate the residual rights to  $F$ ,  $F$  payoff is  $P_f - K_0 + r(e_f) - e_f$ .  $F$  would only prefer  $C$  have residual rights if their payoff under  $C$  having residual was higher:

$$\begin{aligned} P_c - K_0 + \lambda[-h(e_c) + r(e_c)] - e_c &> P_f - K_0 + r(e_f) - e_f \\ \iff P_c &> P_f + r(e_f) - e_f - \lambda[-h(e_c) + r(e_c)] + e_c \end{aligned}$$

From the  $C$  perspective, they will prefer to have residual rights if their payoff is higher than when  $F$  has residual rights:

$$\begin{aligned} -P_f + B_0 - h(e_f) &< -P_c + B_0 + (1 - \lambda)[-h(e_c) + r(e_c)] \\ \iff P_c &< P_f + h(e_f) + (1 - \lambda)[-h(e_c) + r(e_c)] \end{aligned}$$

Therefore, the only possible values of  $P_c$  for which  $F$  and  $C$  prefer that  $C$  have residual rights is when:

$$P_f + h(e_f) + (1 - \lambda)[-h(e_c) + r(e_c)] > P_c > P_f + r(e_f) - e_f - \lambda[-h(e_c) + r(e_c)] + e_c$$

By adding  $-P_f - e_c - h(e_c)$  we get that:

$$-e_c - h(e_c) + h(e_f) + (1 - \lambda)[-h(e_c) + r(e_c)] > P_c > -h(e_c) + r(e_f) - e_f - \lambda[-h(e_c) + r(e_c)]$$

Then rearrange so that:

$$\begin{aligned} -e_c - h(e_c) + h(e_f) + (1 - \lambda)[-h(e_c) + r(e_c)] &> P_c > -h(e_c) + r(e_f) - e_f - \lambda[-h(e_c) + r(e_c)] \\ \iff -e_c - h(e_c) + h(e_f) + (1 - \lambda)[-h(e_c) + r(e_c)] + \lambda[-h(e_c) + r(e_c)] &> P_c > -h(e_c) + r(e_f) - e_f \\ \iff -e_c - h(e_c) + h(e_c) + -h(e_c) + r(e_c) &> P_c > -h(e_f) + r(e_f) - e_f \\ \iff -h(e_c) + r(e_c) - e_c &> P_c > -h(e_f) + r(e_f) - e_f \end{aligned}$$

However, because  $S_f > S_c$  this can never be true.. Therefore parties chose to allocate residual data rights optimally.

# Treatment and Control Groups

Table 1: Treatment Group (1)

Site	Category	Monthly Users
Aa.com	Transportation	20493866
Adobe.com	Software	241500514
Airbnb.com	Travel	53553240
Amazon.com	Retail	2472943016
Amazonaws.com	Online Tool	48044501
Americanexpress.com	Financial Services	56377079
Ancestry.com	Online Resource	47119609
Aol.com	Online Tool	241554967
Apple.com	Online Tool	403914557
Asana.com	B2B	40358347
Bloomberg.com	News	82573426
Cargurus.com	Marketplace	58128951
Cengage.com	Education	21583034
Chaturbate.com	Adult	338829298
Concursolutions.com	B2B	7185788
Costco.com	Retail	89697479
Couchsurfing.com	Travel	1745024
Craigslist.org	Marketplace	379892958
Crunchyroll.com	Entertainment	53529930
Dell.com	Computers	53921574
Ea.com	Games	40362194
Etsy.com	Marketplace	329503361
Eventbrite.com	Experience	22795838
Evernote.com	Online Tool	35656192
Evilangellive.com	Adult	50002
Expedia.com	Travel	24877257
Facebook.com	Social Network	25483458154
Fedex.com	Logistics	166422901
Flickr.com	Online Resource	65476084
Foodnetwork.com	Broadcasting	44755005
Fool.com	Financial Services	61286382
Forbes.com	News	141666315
Gap.com	Retail	57349702
Glassdoor.com	Job Portal	48586096
Gofundme.com	Crowdfunding	45528259
Google.com	Online Tool	82170054421
Gotomeeting.com	Communications	24995393
Groupon.com	Shopping	28990670
Hilton.com	Travel	11468610
Hotels.com	Travel	26206583
Houzz.com	Online Resource	24390923
Howaboutwe.com	Dating	

Table 2: Treatment Group (2)

Site	Category	Monthly Users
Hp.com	Computers	70181619
Hubspot.com	B2B	30832682
Huffingtonpost.com	News Aggregator	3056098
Indeed.com	Job Portal	372144087
Instructure.com	Education	
Joinhoney.com	Retail	20539197
Kayak.com	Travel	12674124
Khanacademy.org	Education	71201459
Kickstarter.com	Crowdfunding	26675690
Leagueoflegends.com	Games	26199461
Lycos.com	Online Tool	618661
Mail.com	Email	20407179
Mailchimp.com	Online Tool	29023697
Marriott.com	Travel	17121710
Match.com	Dating	32719134
Meetup.com	Social Network	14376801
Microsoft.com	Online Tool	885580294
Monster.com	Job Portal	9577532
Mozilla.org	Software	99226661
Netflix.com	Online Media	2678995835
Newegg.com	Computers	30944889
Newsweek.com	News	36197150
Nextdoor.com	Social Network	114320431
Nhl.com	Sports	17376464
Nike.com	Retail	96560501
Nordstrom.com	Retail	36107082
Okcupid.com	Dating	23364932
Okta.com	SAS	99003048
Onelogin.com	Online Tool	16521489
Oracle.com	SAS	28892361
Paypal.com	Payment	551109192
Photobucket.com	Online Resource	4966105
Pinterest.com	Online Resource	1010346370
Qualtrics.com	Online Tool	65400223
Quizlet.com	Education	95519259
Quora.com	Online Resource	497388732
Reverb.com	Marketplace	16167999
Roblox.com	Games	724297361
Scribd.com	Online Media	81283005
Service-now.com	B2B	47663686
Sex.com	Adult	27008522
Shutterstock.com	Online Resource	74459168
Slack.com	Communications	130571153
Sloutroulletlive.org	Adult	
Smartsheet.com	B2B	16120797
Snap.com	Online Tool	1677946
Speedtest.net	Online Tool	111957220

Table 3: Treatment Group (3)

Site	Category	Monthly Users
Squarespace.com	SAS	29949615
Squareup.com	Payment	22898392
Starbucks.com	Experience	13477258
Steamcommunity.com	Games	145811147
Steampowered.com	Games	141498645
Streamate.com	Adult	4744390
Surveymonkey.com	Online Resource	67723098
Taleo.net	SAS	34292295
Theepochtimes.com	News	13114544
Thefreedictionary.com	Reference	35123337
Time.com	Entertainment	28114940
Tripadvisor.com	Travel	91473768
Turnitin.com	Education	13225821
Twitter.com	Blogging	5683594299
Uber.com	Transportation	52963308
Udemy.com	Learning	105422093
Ultipro.com	SAS	23311418
United.com	Transportation	10597987
Ups.com	Logistics	209769526
Vimeo.com	Video platform	113739554
Vividcams.com	Adult	
Vrbo.com	Travel	29256194
Warnerbros.com	Entertainment	1349408
Wayfair.com	Retail	142364565
Weather.com	Online Resource	515029116
Webex.com	Communications	108405743
Weebly.com	SAS	78491720
Whatsapp.com	Communications	2342480271
Wikihow.com	Reference	105778426
Wikimedia.org	Reference	73334930
Wikipedia.org	Reference	5401282779
Wish.com	Retail	119834046
Wordpress.com	SAS	437390597
Wowhead.com	Online Resource	51876893
Yahoo.com	Online Tool	3555114286
Youtube.com	Video platform	32935446426
Zendesk.com	B2B	80850968
Ziprecruiter.com	Job Portal	35373167
Zoom.us	Communications	1694880979
Zoosk.com	Dating	19941104
Zulily.com	Shopping	23580465

Table 4: Control Group (1)

Site	Category	Monthly Users
Adoptapet.com	Marketplace	8918523.50
Allrecipes.com	Social Network	94821150.83
Apnews.com	News	36790822.33
Att.com	Telecom	137141520.17
Autotrader.com	Marketplace	26322528.50
Barnesandnoble.com	Retail	20342557.00
Bedbathandbeyond.com	Retail	33433252.00
Bestbuy.com	Retail	135750580.83
Bhphotovideo.com	Retail	28099866.50
Biblegateway.com	Publishing	73362070.33
Bleacherreport.com	Sports News	36853675.83
Breitbart.com	News	67655248.67
Brobible.com	Entertainment	2293369.00
Cars.com	Marketplace	25187216.33
Cbsinteractive.com	Broadcasting	81316.83
Cbslocal.com	Broadcasting	41756425.67
Celebrityinsider.org	Entertainment	3801737.67
Chegg.com	Education	45448128.67
Chron.com	News	26192982.00
Citationmachine.net	Education	8768404.00
Cnbc.com	News	151065360.17
Cnet.com	Tech Publications	100776943.33
Cnn.com	Broadcasting	754849182.00
Coursehero.com	Learning	33274017.67
Cvs.com	Retail	58262971.00
Dailysnark.com	Entertainment	492736.50
Digg.com	Entertainment	6048051.33
Drudgereport.com	News Aggregator	64188549.83
Edmunds.com	Online Resource	14594336.67
Espn.com	Broadcasting	302465782.00
Fantasypros.com	Sports News	9188439.67
Foxnews.com	Broadcasting	372706915.83
Geico.com	Insurance	18040911.33
Heavy.com	News Aggregator	18253464.33
History.com	Entertainment	23407125.50
Hollywoodreporter.com	Entertainment	18112135.50
Homedepot.com	Retail	243572880.50
Hustler.com	Adult	431617.17
Icims.com	B2B	22100617.50
Iheart.com	Entertainment	28538899.17
Inc.com	Tech Publications	15298901.33
Infusionsoft.com	B2B	7566305.83
Investopedia.com	Reference	61291902.67
Jumpshare	File storage	394302.50
Kbb.com	Reference	17668314.83
Kohls.com	Retail	63835291.00
Ksl.com	News	22162875.00

Table 5: Control Group (2)

Site	Category	Monthly Users
Latimes.com	News	54197920.83
Lifewire.com	Reference	20877211.67
Lotterypost.com	Reference	11621651.33
Lowes.com	Retail	141134676.33
Medium.com	Blogging	199801651.33
Mheducation.com	Education	27573631.83
Mlb.com	Sports	42521904.83
Nbcnews.com	News	89397311.50
Nerdwallet.com	Online Resource	19179962.33
Nesn.com	Entertainment	3700295.17
Nfl.com	Sports	39201546.83
Npr.org	Broadcasting	96377216.67
Nypost.com	News	124092220.33
Ourtime.com	Dating	9662319.50
Pandora.com	Online Media	31138338.50
Patch.com	News	41699939.67
Pbs.org	Broadcasting	21544105.33
People.com	Entertainment	71449179.67
Politico.com	News	70921108.00
Poshmark.com	Marketplace	33220462.33
Powerschool.com	Education	23296159.50
Priceline.com	Travel	20746133.17
Quizizz.com	Education	64990565.67
Redfin.com	Real Estate	64437421.67
Retailmenot.com	Shopping	30832264.50
Rottentomatoes.com	Online Resource	53470080.00
Samsclub.com	Retail	43608161.33
Schoology.com	Education	72114940.50
Seekingalpha.com	Online Resource	28940707.50
Sfgate.com	News	39448272.50
Shutterfly.com	Online Resource	15008774.67
Signupgenius.com	Online Tool	13048776.83
Slickdeals.net	Shopping	65055262.83
Smugmug.com	Online Tool	5068214.17
Southwest.com	Transportation	21193896.00
Spanishdict.com	Online Resource	26255019.83
Study.com	Learning	28566195.33
Swagbucks.com	Shopping	17932496.33
Take2games.com	Games	726139.00
Target.com	Retail	201540033.33
Teachable.com	Marketplace	16989028.50

Table 6: Control Group (3)

Site	Category	Monthly Users
Teacherspayteachers.com	Marketplace	24627340.67
Theatlantic.com	Entertainment	47602074.00
Thedailybeast.com	News Aggregator	37740119.67
Thehill.com	News	73782920.83
Thoughtco.com	Education	17481064.17
Tmz.com	Entertainment	50900098.83
Trulia.com	Real Estate	62227391.83
Usatoday.com	News	129374519.83
Verizon.com	Telecom	44560452.33
Verizonwireless.com	Telecom	38971623.33
Walgreens.com	Retail	52924799.50
Walmart.com	Retail	425708875.83
Washingtonpost.com	News	209841074.33
Westernjournal.com	News	13435245.83
Whitepages.com	Reference	29327164.17
Wsj.com	News	70854509.83
Wunderground.com	Online Resource	58808619.33
Xfinity.com	Telecom	167921139.67
Zappos.com	Retail	18547074.17
Zynga.com	Games	6876490.17



## Intensity of EU Exposure

Table 7 shows the effect of the intensity of E.U. exposure on the likelihood of a privacy policy becoming less stringent. Unlike the main analysis of the paper, the independent variable that measures exposure to the GDPR is not a binary variable. Rather it is meant to capture the extent or intensity of E.U. exposure. As a proxy for E.U. exposure we consider the percentage of a website’s traffic that comes from the E.U., as measured in October 2020.

The dependent variable in Table 7 is a binary variable which receives a value of 0 if the policy in 2020 is unchanged from its 2018 policy with respect to the consent provision, or if the consent provision has become more stringent. The variable receives a value of 1 if the policy has a less stringent consent provision relative to the consent provision in 2018.

Table 7 reports the estimates from a logit regression. The coefficient of the variable of percentage of EU users can be interpreted as meaning that a 1% in E.U. users leads to an increase of 5% in the likelihood of making a policy less stringent.

Table 7: Effect of EU Exposure Intensity

(1)	
consent_change_num	
consent_change_num	
pct_EU_users	0.0500* (2.03)
_cons	-2.324*** (-9.34)
<i>N</i>	238

*t* statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$