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ICANN

Economic Analysis of Whether .info and .org Possess Market Power

Prepared by:
Gregory K. Leonard, Vice President
Charles River Associates
601 12th Street
Oakland, CA

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1. Qualifications

I am an economist and Vice President at Charles River Associates (CRA). I received a Bachelor of Science in Applied Mathematics-Economics from Brown University in 1985 and a Ph.D. in Economics from the Massachusetts Institute of Technology in 1989. After receiving my Ph.D., I became an assistant professor at Columbia University. I subsequently moved into economic consulting and worked at several economic consulting firms prior to joining CRA.

My specialties within economics are applied microeconomics, the study of the behavior of consumers and firms, and econometrics, the application of statistical methods to economics data. I have published more than sixty articles in scholarly and professional publications. Many of these articles address issues in industrial organization, antitrust economics, and econometrics.

I served as the Vice Chair for Economics of the Board of Editors of the American Bar Association's *Antitrust Law Journal* from 2018 to 2023 and am currently a Senior Editor for that publication. I have also served as a referee for numerous economics and other professional journals. I have given invited lectures on antitrust issues at the Federal Trade Commission (FTC), the United States Department of Justice (DOJ), the Directorate General for Competition of the European Commission, the Fair Trade Commission of Japan, and China's Supreme People's Court and antitrust agency. I have been retained by the DOJ to consult on antitrust matters. In 2007, I served as a consultant to, and testified before, the Antitrust Modernization Commission, which was tasked by Congress and the President of the United States to make recommendations for revising U.S. antitrust laws.

2. Summary of Conclusions

The registry agreements that were entered into between ICANN and the registry operators of .info (Identity Digital¹) and .org (Public Interest Registry (PIR)) in June 2019 did not contain the price control provision that had been present in the predecessor registry agreements. I have been asked by ICANN to provide input regarding the current domain name system (DNS) marketplace as it relates to the market power of .info and .org.²

My conclusions are as follows, with supporting analysis and discussion contained in the text of this report.

- In a market economy, prices are the mechanism through which the market achieves an efficient allocation of resources. Regulatory price controls interfere with this basic

¹ Identity Digital was formed by combining operations of Donuts Inc. and Afilias, Inc. (which itself had been acquired by Donuts Inc. in 2020 and had operated .info prior to the acquisition). PR Newswire, "Donuts Inc. and Afilias, Inc. Rebrand to Identity Digital," June 22, 2022, available at <https://www.prnewswire.com/news-releases/donuts-inc-and-afilias-inc-rebrand-to-identity-digital-301572401.html>. In this report, I use "Identity Digital" to refer to the pre-acquisition Afilias, Inc. as well as the post-combination entity.

² In the course of my analysis, I reviewed the materials and information listed in Appendix B to this report. Among those materials were the public comments ICANN received in 2019 in response to the proposed new registry agreements for .org and .info. See <https://www.icann.org/en/public-comment/proceeding/proposed-renewal-of-org-registry-agreement-18-03-2019>; <https://www.icann.org/en/public-comment/proceeding/proposed-renewal-of-info-registry-agreement-18-03-2019>. This report addresses the economics-related concerns that were expressed by commenters.

market mechanism and lead to a misallocation unless the regulator is highly informed and nimble, which has historically rarely been the case. A regulator setting the wrong price is not harmless—rather, the wrong price can lead to a decrease in economic efficiency and innovation. For these reasons, price controls are disfavored in market economies except in narrow circumstances where a firm has substantial and durable “market power”—the ability to charge a price significantly above the competitive level for an extended period of time.

- Currently, we have four years of historical experience of Identity Digital and PIR setting wholesale registration prices for .info and .org, respectively, without being subject to the price control provision. During that time, contrary to what would have been expected had the price control provision been constraining the wholesale registration prices of .info and .org, we did not see those prices increase significantly. Rather, the .org price has not increased at all and the .info price has not increased more than the price control provision would have allowed, had it been in place. In the absence of the price control provision, the wholesale registration prices for .info and .org were almost certainly constrained during the last four years by competitive market forces and other factors. Thus, the historical experience is consistent with .info and .org not having substantial and durable market power.
- Additional evidence demonstrates that .info and .org do not have substantial and durable market power.
 - First, .info and .org face competition from other TLDs. Indeed, the extent of this competition has increased over time as additional TLDs have been introduced and gained an increasing share of registrations. At the same time that other TLDs’ shares of registrations have been growing, the number of registrations, as well as the share of registrations, on .info and .org has fallen over time.
 - Second, the wholesale registration prices for .info and .org have been in line both with inflation as well as the registration prices of other TLDs.
 - Third, under the existing .info and .org registry agreements, a registrant through a registrar has the option of locking the current registration price for a period of ten years. This provision protects against any attempt to increase the prices of .info and .org excessively in the future.
 - Fourth, PIR is a not-for-profit entity. According to its public statements, PIR views its role as serving the public interest online and “stewardship” of the “.ORG community.” It would be contrary to PIR’s stated goals to increase its registration price excessively by exploiting any market power it possessed.
 - Fifth, market factors would constrain .org or .info from engaging in opportunism, such as by increasing renewal prices targeting existing registrants that are “locked in” by switching costs to .org or .info.
- The foregoing factors mean that registrars as well as registrants are protected from excessive wholesale price increases. However, in addition registrars have the incentive and ability to pass on wholesale price increases to retail prices without losing many customers. This provides further protection to registrars from any adverse impact.
- There is no reason to believe that the lack of substantial and durable market power for .org and .info will change in the future.

3. Background on the Domain Name System

An Internet domain name such as “crai.com” consists of a “top level domain name” (TLD), in this case “.com,” and a “second level domain name” (SLD), in this case, “crai”.

ICANN is responsible for coordinating the Internet’s DNS. Originally, seven TLDs were created, including .com and .org.³ These seven TLDs existed prior to ICANN’s creation. In 2001 and 2002, ICANN authorized seven new TLDs, including .info.⁴ Subsequently, ICANN has authorized over 1,200 further TLDs.⁵ Also, in addition to “generic” TLDs (gTLDs), such as .org, there are “country code” TLDs (ccTLDs), such as .us and .uk.

Most gTLDs are administered by a registry operator pursuant to contract with ICANN. For example, PIR is the registry operator of .org and Identity Digital is the registry operator of .info. An entity (such as a company or individual) wishing to register a given domain name, known as a registrant, works with a registrar, or a reseller that is in partnership with a registrar, that serves as an intermediary between the registrant and the registry operator of the TLD. The registry operator charges the registrar or reseller a “wholesale price” for the registration and the registrar or reseller in turn charges the registrant a “retail price.”

ICANN has entered into registry agreements with the registry operators of most gTLDs⁶ that specify the operators’ obligations as TLD administrators. The 2013 registry agreements for .info and .org each contained a price control provision that prohibited the registry operator from increasing its registration price in a calendar year by more than 10% of the previous calendar year’s registration price.⁷ This price control provision was not included in the registry agreements that PIR and Identity Digital entered in June 2019. Thus, since June 2019, .org and .info have not been subject to the price control provision.

Verisign, the registry operator of .com, agreed with the U.S. Department of Commerce to be bound by a price control provision, which remains in place currently.⁸ ICANN did not play a role in the negotiation of the Verisign price control provision.

³ ICANN, “Top-Level Domains (gTLDs)”, last accessed November 9, 2023, available at <https://archive.icann.org/en/tlds/>.

⁴ Id.

⁵ ICANN, “Registry Listings,” last accessed November 9, 2023, available at <https://www.icann.org/resources/pages/listing-2012-02-25-en>.

⁶ ICANN does not have registry agreements with the operators of ccTLDs.

⁷ .info Registry Agreement (August 22, 2013), Section 7.3(a); .org Registry Agreement (August 22, 2013), Section 7.3(a).

⁸ Under the most recent version of this provision, Verisign is limited to the following: in each of the last four years of every six-year period, it may increase price by up to 7% over the previous year’s highest price. See Amendment to Financial Assistance Award, U.S. Department of Commerce and Verisign, October 26, 2018, available at https://www.ntia.gov/files/ntia/publications/amendment_35.pdf. The Department of Commerce agreed to provide Verisign more pricing flexibility than previously “[i]n recognition that ccTLDs, new gTLDs, and the use of social media have created a more dynamic DNS marketplace.” Id.

4. In Market Economies Like the U.S., Price Controls Generally Are Disfavored by Policy-Makers

In a market economy, production and consumption decisions are made in a decentralized fashion by individual economic agents, e.g., companies and consumers. Prices play an important role in the decision-making of these agents. For example, a consumer decides how much of various products to buy depending on the products' prices. A company decides to invest in improving the quality of its product if the additional price it could charge given higher quality exceeds the cost of the quality improvement.

Prices accumulate and incorporate market information about consumer demand and producers' costs so that they signal the value of resources and give economic agents the incentive to put resources to their highest value use. As a result, prices promote the efficient allocation of resources. This is the great achievement of markets.

Price regulation, in contrast, involves a central authority, often a government body, setting a price outside of the market mechanism. To the extent that the regulated price differs from the price that would have been set by the market, the regulated price will distort the incentives to economic agents and thus distort the allocation of resources. In the absence of certain narrow circumstances to be discussed below, this distorted allocation will be inefficient.

An extreme example of price regulation is a centrally planned economy. In such an economy, government bureaucrats typically set both prices and production quantities. While bureaucrats may attempt to incorporate information on the value of various resources in various end uses, their information is often incomplete, they typically have only a limited understanding of the industries they regulate, and they face problems of coordination among different sectors of the economy and among themselves (when different bureaucrats set prices for different industries). The result is that centrally planned economies have typically been woefully inefficient, sometimes with disastrous consequences.⁹

While markets have far outperformed central planning, there are certain circumstances under which markets may fail to produce an efficient allocation of resources. One example is monopoly. A monopolist is a supplier able to charge a price that exceeds the competitive (efficient) level. In the abstract, government price regulation may have the scope to increase efficiency by forcing the monopolist to charge a price closer to the efficient level. However, just as is the case for a central planner, determining the efficient price is not straightforward for a price regulator given informational constraints. Setting the price too low will generally lead the monopolist to underinvest in innovation, which creates a new inefficiency. Setting it too high will fail to correct the price-related inefficiency. The difficulties involved with price regulation is one reason, for example, that the U.S. Department of Justice and Federal Trade Commission generally decline to use price controls as a remedy for mergers deemed likely to lessen competition. Instead, these agencies require structural remedies, such as that the merged firm divest certain assets to a competitor. ICANN notably has made its own "structural" changes to competition in the TLD space by authorizing the entry of numerous new gTLDs.

Fortunately, even if left unregulated, monopoly status often is not long-lasting because the monopoly prices and resulting profits attract firms that seek to compete with the monopolist for those profits. The competition from new entrants drives prices down toward the efficient

⁹ See, e.g., John R. Moroney and C. A. K. Lovell, "The Relative Efficiencies of Market and Planned Economies," *Southern Economic Journal*, 1997, pp. 1084-1093; Israel Kirzner, "Economic Planning and the Knowledge Problem," *Cato Journal*, Vol. 4, No. 2, 1984, pp. 407-418. For example, China's efforts to centrally plan agricultural output during the "Great Leap Forward" led to the deaths of millions by starvation because the associated disincentives led farmers to cut back farm production.

level. Again, prices serve as a valuable signal and incentive—in this case, the monopoly prices induce entry that eliminates the inefficiency. Because of the tendency for monopoly to be eroded by market forces, price regulation has been used only sparingly in the United States in recent times. The exceptions have been when a firm has market power that is both substantial and expected to be long-lived. Examples are when a monopoly has been conferred by the government, such as in the case of certain public utilities, or when there exist economies of scale or barriers to entry are so substantial that only one firm can exist profitably (a so-called “natural monopoly”).¹⁰ As discussed below, .info and .org do not come close to fitting within these exceptions.

5. Four Years of .info and .org Operating Unconstrained By the Price Control Provision Demonstrates That They Do Not Have Substantial and Durable Market Power

Given the general disfavor with which price controls are viewed, an important economic question to consider is whether there is a substantial danger that, absent any price controls, prices would increase excessively.

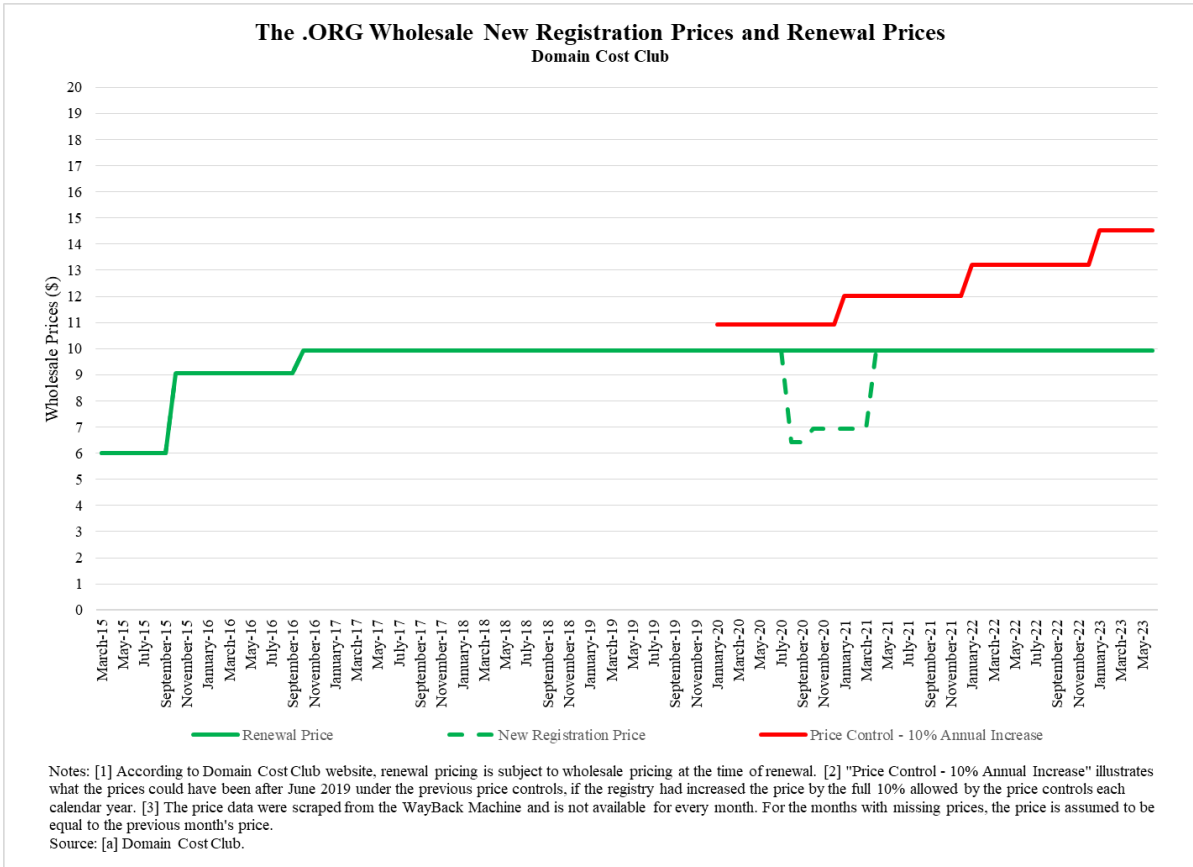
We now have over four years of historical experience, from June 2019 to June 2023 (the last period for which I have data), during which the operators of .info and .org have been unconstrained by the pricing provision. Two points can be made about this historical experience. First, if .info and .org had substantial and durable market power that was held in check by the price control provision, one would have expected to see sharp increases in their wholesale registration prices to registrars immediately after the price controls were lifted in June 2019. However, that did not occur. Indeed, the wholesale registration price of .org has not increased at all, and the wholesale registration price of .info has not increased by more than would have been allowed had the price control provision remained in place. Second, because the price control provision was no longer in place, it must have been competitive market forces or other factors that constrained the prices of .info and .org during the last four years. The overall conclusion is that .info and .org do not have substantial and durable market power.

¹⁰ In the more distant past in the US, government entities price-regulated certain industries, such as airlines, trucking and railroads. However, those regulations were eliminated through bipartisan legislation in the 1970s and 1980s and it is generally agreed that deregulation has improved economic outcomes. See, e.g., Clifford Winston “U.S. Industry Adjustment to Economic Deregulation,” *Journal of Economic Perspectives*, Vol. 12, No. 3, 1998, pp. 89-110.

5.1. History of .org Registration Pricing

I have gathered registration price data for the period between March 2015 and June 2023.¹¹ Currently, the wholesale price to registrars is the same for both new registrations and renewals on .org. That price has remained constant since late-2016, see Figure 1.¹²

Figure 1



In Figure 1, I also depict with a red line the maximum price that could have been charged on .org after June 2019 had the price control provision remained in place. The actual .org price was well below the red line throughout the period. The fact that the .org price remained below the levels that the price control provision would have allowed instead of increasing

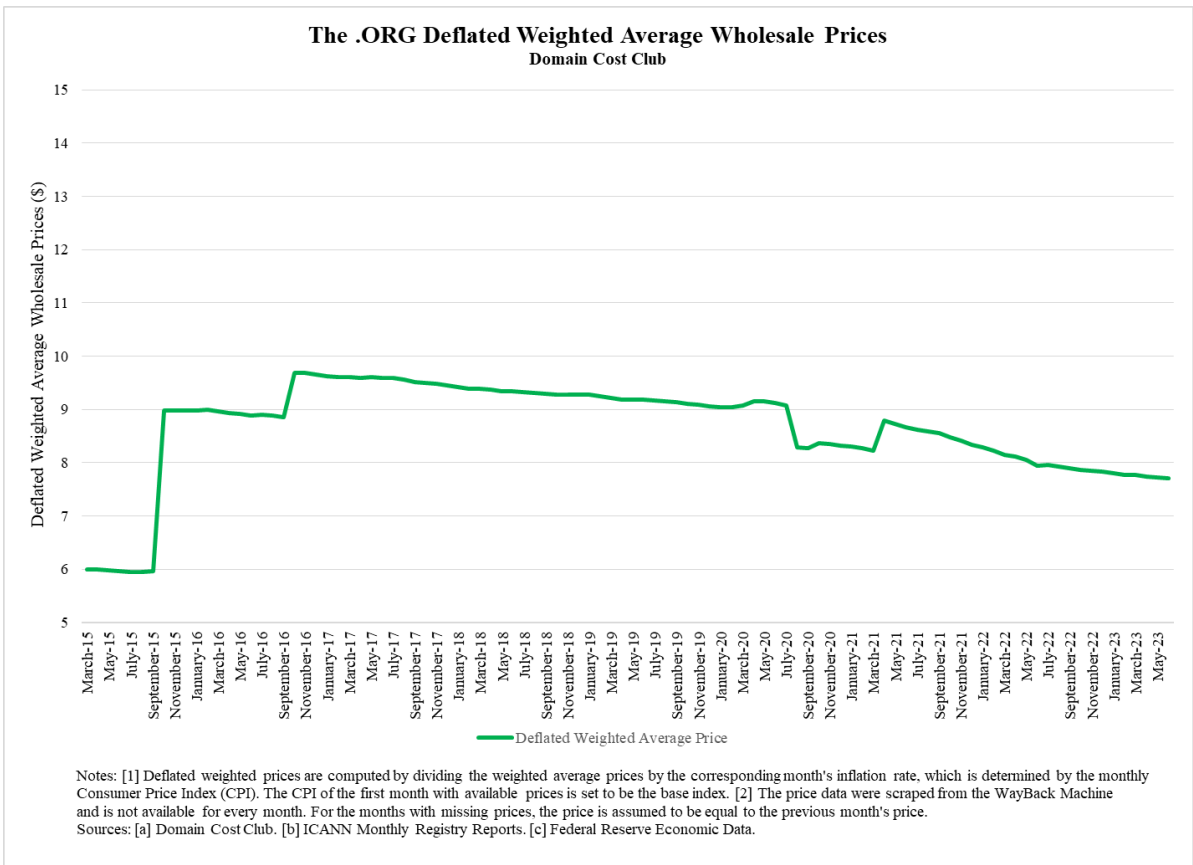
¹¹ The price data were obtained from the Domain Cost Club using the WayBack Machine at https://web.archive.org/web/20230000000000*/domaincostclub.com/pricing.dhtml. Domain Cost Club is a registrar that gives its customers the option to pay an annual membership fee for access to discounts on domain pricing. Domain Cost Club sells domains to its Club Members "at-cost," i.e., at the wholesale price charged by the registry.

¹² For a brief period starting in the middle of 2020, a discounted price was charged for new registrations on .org while the renewal price remained the same. During this period, I calculated a weighted average of the two prices and used that weighted average in Figure 1. The weights for the new registration and renewal prices in calculating this weighted average are the percentages of all registration transactions that are new registrations and renewals, respectively.

significantly above those levels means: (1) the price control provision would have been superfluous for .org had it been in place after June 2019, (2) market forces (rather than the price control provision) or its own goals as a not-for-profit entity (see below) served to constrain .org pricing, and (3) .org did not have substantial and durable market power that the price control provision was constraining.

I have also compared the (lack of) changes in the .org price to changes in the general price level as represented by the Consumer Price Index (CPI). The CPI-deflated .org price has decreased over the long-term, see Figure 2, meaning that the .org price has decreased relative to the general price level.

Figure 2

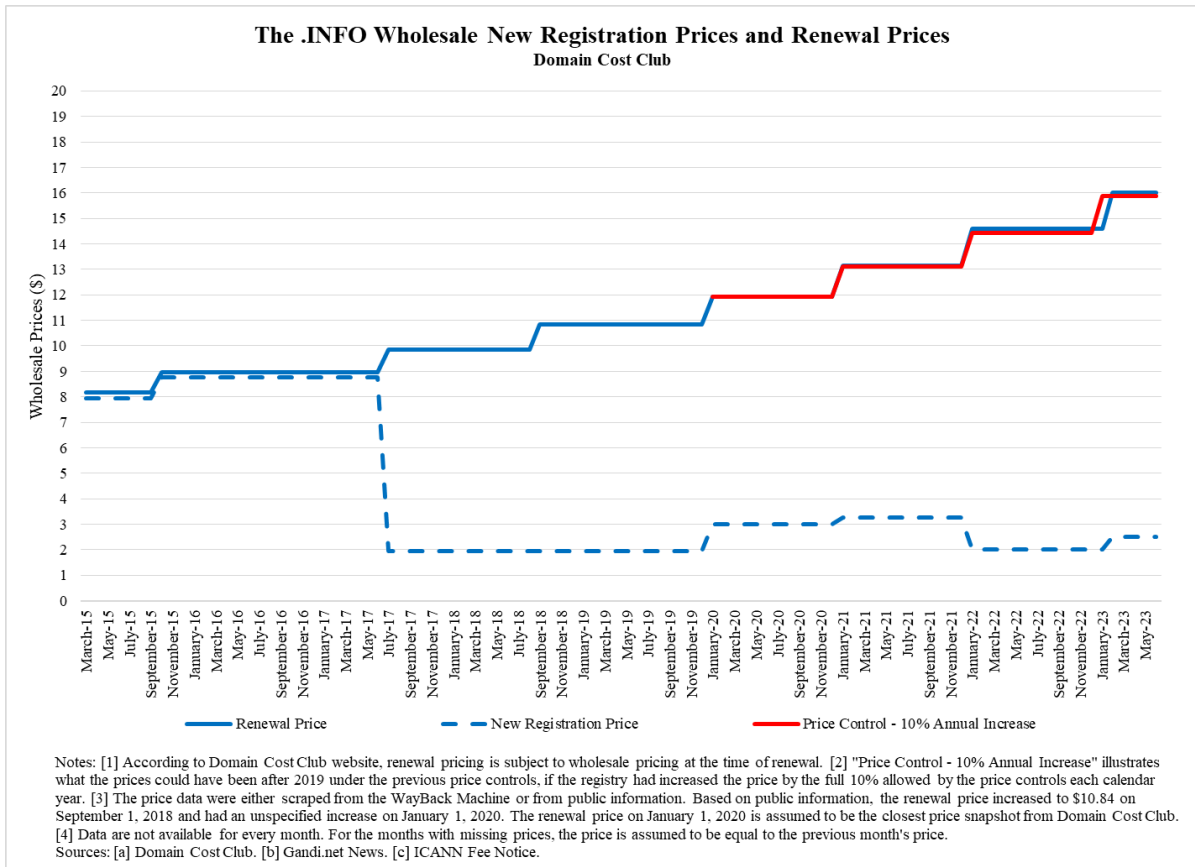


5.2. History of .info Registration Pricing

Figure 3 below shows the price history for .info. Essentially the same wholesale price was charged to registrars for new and renewal registrations on .info from the beginning of the period for which I have data until June 2017, at which point the .info pricing strategy changed, with a discounted price charged for new registrations.¹³

¹³ In Section 6.3 below, I further discuss the .info strategy of offering different prices for new registrations and renewals. The strategy is common among TLD registry operators.

Figure 3

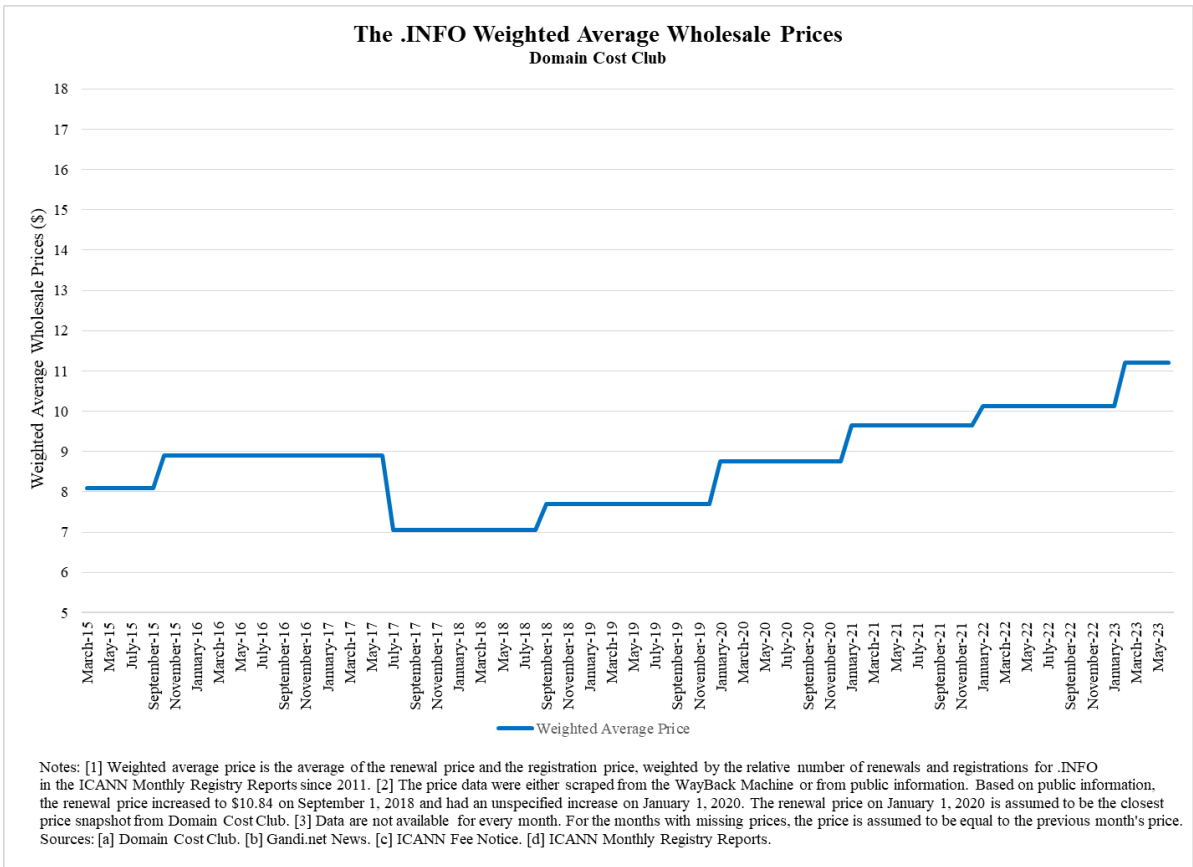


In Figure 3, I depict with a red line the maximum price that Identity Digital could have charged for renewals after June 2019 had the price control provision remained in place. The blue line representing the actual prices approximately coincides with the red line. The fact the renewal price for .info did not increase by more than the price control provision would have allowed, had it remained in place, means that market forces (rather than the price control provision) served to constrain the .info pricing, and .info did not have substantial and durable market power that the price control provision was constraining.

For the purposes of analyzing price trends and making comparisons with other TLDs, it is useful to calculate a weighted average of the new registration and renewal .info prices.¹⁴ The resulting weighted average price for .info is presented in Figure 4.

¹⁴ As described above for .org, I use the percentage of registrations that are new and renewal registrations, respectively, as the weights for the new and renewal .info prices.

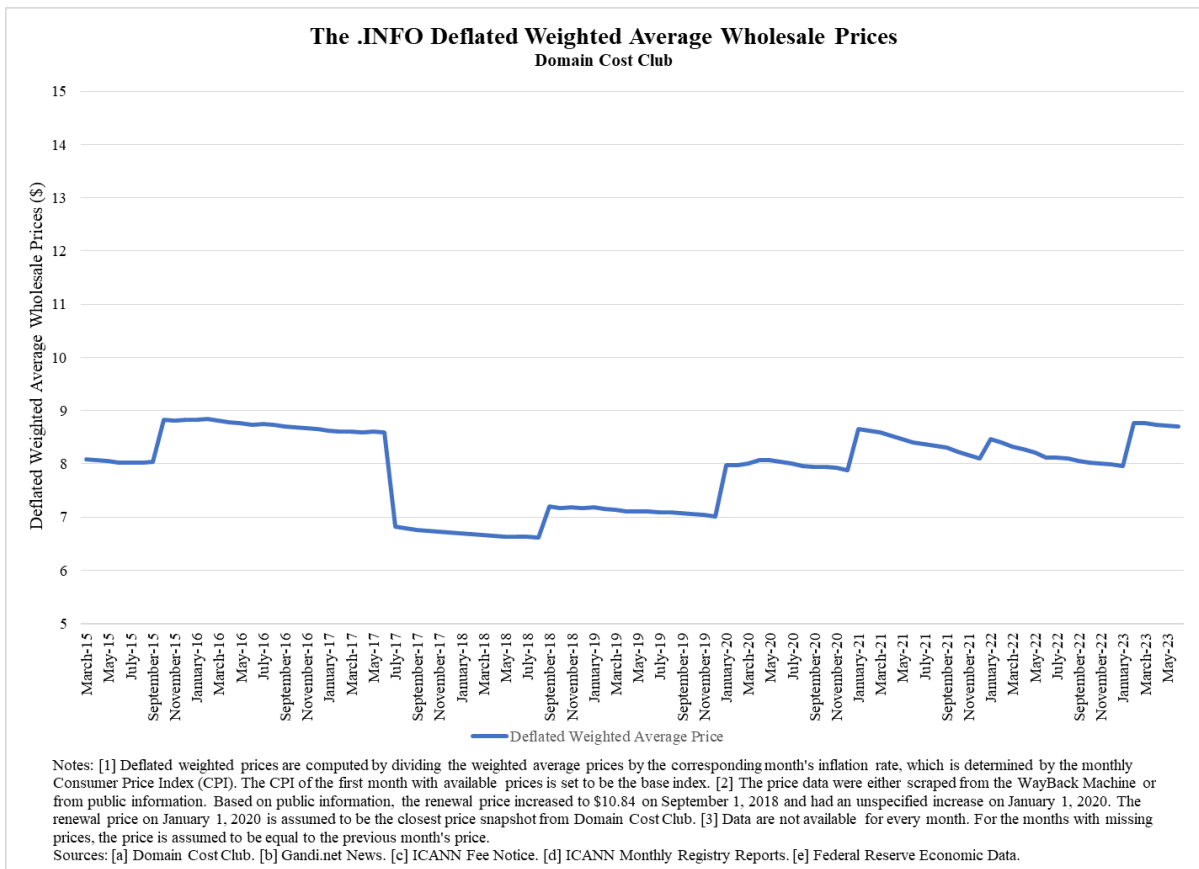
Figure 4



When the new registration pricing strategy for .info was first adopted in mid-2017, the .info weighted average price declined because the price for new subscriptions was substantially discounted from the price for renewals. Thereafter, while increasing steadily, until the latter part of 2020 the .info weighted average price remained below its level prior to the change in .info pricing strategy.

Another way to assess the economic reasonableness of the .info price trend is to ask how the change in the .info weighted average price compared to inflation. Figure 5 below presents the .info weighted average price after deflating by the CPI. In June 2023, the deflated weighted average .info price was approximately the same as it was in 2016 prior to the change in pricing strategy. In other words, the .info price change between 2016 and June 2023 was largely in line with inflation over the long term.

Figure 5



In conclusion, historical experience demonstrates that market and other forces have constrained the wholesale prices of .info and .org charged to registrars, even in the absence of the price control provision. These prices have not increased by amounts greater than the price control provision would have allowed after that provision was lifted, which is what one would have expected if .org and .info had substantial and durable market power that was being constrained by the provision. Indeed, the prices have declined in real terms (.org) or approximately been consistent with increases in general price levels (.info).

6. Competitive Market Forces and Other Factors Constrain the Prices of .org and .info

As noted above, the exception to the disfavoring of price controls in a market economy is when the firm in question has substantial and durable market power. However, .org and .info do not have such substantial and durable market power. Rather, they face competitive forces that constrain their pricing.

6.1. .org Faces Competition from Other TLDs

6.1.1. Registrants Have Many Alternatives to .org, and Increasingly Have Chosen Those Alternatives

A firm has no market power when customers have good substitutes, or alternatives, to which they could turn if the firm attempted to increase its price above the competitive level. In the case of .org, alternative TLDs exist to which registrants could turn if the .org price were to increase above the competitive level. Indeed, as .org's registry operator PIR recognized in a public statement, ".ORG is constrained by the competitive market; we cannot dramatically increase prices for .ORG, as we recognize and understand that both our .ORG end users and our .ORG registrars would turn away from .ORG."¹⁵

Currently, a registrant has over 1500 TLDs (including both gTLDs and ccTLDs) from which it can choose. For only approximately 3% of registrations does the registrant choose .org, see Table 1A below.¹⁶ Thus, the vast majority of registrants choose a TLD other than .org. A firm cannot have market power when its customers have many substitute products to which they could turn. Indeed, antitrust scholars and practitioners recognize that a firm with a share below 50% is unlikely to have substantial market power.¹⁷

Alternatives to .org include TLDs such as .com, .net, and .info. .com, in particular, has the largest share of registrations among all TLDs (see Table 1A) and, as noted above, is subject to a price control provision that it negotiated with the US Department of Commerce. That .com is a viable substitute for .org is demonstrated by the fact that one firm may choose .org while a competing firm chooses .com. For example, while online learning platforms Coursera and EdX use the .org TLD, other online learning platforms like Skillshare and Udemy use the .com TLD.¹⁸ Given that competing firms make different choices of TLD, those different choices must themselves be substitutes for those firms.

¹⁵ PIR, "An Open Letter to the .ORG Community," May 1, 2019, available at <https://thenew.org/an-open-letter-to-the-org-community/>.

¹⁶ Table 1A is based on data obtained from DomainTools. DomainTools provides domain counts for both gTLDs and ccTLDs. Another source for registration counts is provided by ICANN monthly registration reports. However, these reports include only gTLDs, not ccTLDs, and thus overstate shares of gTLDs. .org's share of only gTLD registrations calculated based on the ICANN monthly registration reports is 5%, see Table 1B. Total registrations include new registrations, renewals, and continuing registrations. Shares of new and renewal registrations for gTLDs, based on the ICANN monthly registration reports, are broken out separately in Table 1B.

¹⁷ See Federal Trade Commission, "Monopolization Defined," available at <https://www.ftc.gov/advice-guidance/competition-guidance/guide-antitrust-laws/single-firm-conduct/monopolization-defined> ("Courts look at the firm's market share, but typically do not find monopoly power if the firm (or a group of firms acting in concert) has less than 50 percent of the sales of a particular product or service within a certain geographic area. Some courts have required much higher percentages.").

¹⁸ See [coursera.org](https://www.coursera.org), [edx.org](https://www.edx.org), [skillshare.com](https://www.skillshare.com), and [udemy.com](https://www.udemy.com), respectively.

Table 1A

TLD Shares (Including Both gTLDs and ccTLDs)*DomainTools - 2016, 2023*

February 2016 Snapshot			December 2023 Snapshot		
Rank	TLD	Share	Rank	TLD	Share
1	com	42.0%	1	com	45.9%
2	tk	8.9%	2	de	4.8%
3	net	5.3%	3	net	3.8%
4	de	4.8%	4	org	3.1%
5	org	3.7%	5	uk	2.9%
6	uk	3.1%	6	cn	2.3%
7	cn	2.9%	7	nl	1.7%
8	info	1.8%	8	ru	1.5%
9	ru	1.6%	9	br	1.3%
10	nl	1.5%	10	tk	1.2%
11	eu	1.3%	11	fr	1.2%
12	br	1.0%	12	au	1.2%
13	fr	1.0%	13	info	1.1%
14	au	0.9%	14	eu	1.1%
15	it	0.8%	15	co	1.0%
all others		19.3%	all others		26.0%
Total		100.0%	Total		100.0%

Notes:

- [1] Shares are calculated based on DomainTools' estimated count of all Domains for each TLD. See <https://research.domaintools.com/statistics/tld-counts/>.
- [2] December 2023 data was gathered on December 8, 2023. February 2016 data was gathered with the Wayback Machine using the February 12, 2016 snapshot.

Source:

- [a] DomainTools.

Table 1B

2023 TLD Shares (ccTLDs Not Included)								
ICANN Registry Reports - Total Domains, Added Domains, and Added or Renewed Domains by TLD								
Sum of Monthly Total Domains			Sum of Monthly Net Adds			Sum of Monthly Net Adds & Renewals		
Rank	TLD	Share	Rank	TLD	Share	Rank	TLD	Share
1	com	72.6%	1	com	60.1%	1	com	70.7%
2	net	5.9%	2	xyz	4.0%	2	net	5.9%
3	org	5.0%	3	net	3.6%	3	org	5.3%
4	xyz	1.8%	4	online	3.2%	4	info	1.9%
5	info	1.8%	5	top	3.1%	5	xyz	1.7%
6	online	1.1%	6	org	3.0%	6	online	1.4%
7	top	1.0%	7	shop	2.2%	7	top	1.2%
8	shop	0.8%	8	site	1.8%	8	shop	0.9%
9	biz	0.6%	9	store	1.7%	9	site	0.7%
10	site	0.6%	10	info	1.7%	10	store	0.7%
11	icu	0.3%	11	biz	0.3%	11	biz	0.6%
12	link	0.1%	12	icu	0.3%	12	link	0.1%
13	bio	0.0%	13	link	0.2%	13	icu	0.1%
14	google	0.0%	14	bio	0.1%	14	bio	0.0%
--	--	--	15	google	0.0%	15	google	0.0%
	all others	8.5%		all others	14.7%		all others	8.9%
	Total	100.0%		Total	100.0%		Total	100.0%

Notes:

[1] Values are sums for all contract lengths and available months in 2023. ICANN Monthly Registry Report data is available January through June in 2023.

[2] Selected TLDs are those in the top 10 for the indicated value, or those identified as "similarly ranked" to .INFO or .ORG using the DomCop data, ICANN data, and Namecheap's listed alternatives. See Appendix A.

Sources:

[a] ICANN Monthly Registry Reports.

[b] Appendix A.

While over time .org has acquired a semantic meaning associated with non-commercial organizations, some .org registrants are in fact commercial entities and some non-commercial organizations choose to use other TLDs. For example, for-profit companies Craigslist, Coursera, and EdX use the .org TLD¹⁹, while non-profit organizations National Christian Foundation, The Merck Patient Assistance Program, and Navigate Affordable Housing use the .com TLD.²⁰ To these entities, despite any non-commercial semantic meaning attached to .org, other TLDs are viable substitutes. Given that PIR charges the same wholesale price for any registration, the existence of "marginal" registrants willing to switch to other TLDs limits PIR's ability to extract a higher price from "inframarginal" registrants who highly value the .org semantic meaning.

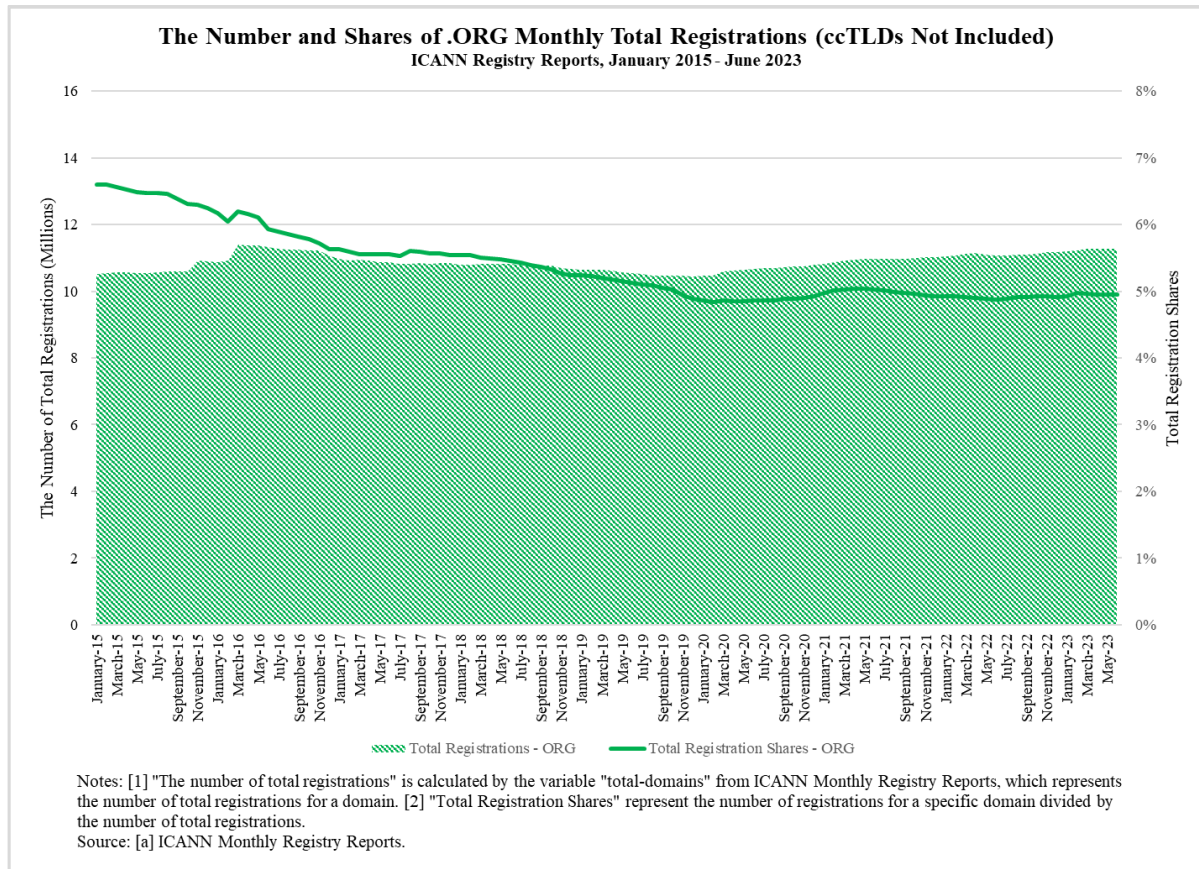
The number of total registrations on .org declined for a time as new TLDs were introduced and gained share, before increasing starting in 2020, see Figure 6. Because total registrations were growing over this same period, .org's share of total gTLD registrations (based on the ICANN monthly registration reports) declined until 2020 and then stabilized, see Figure 6. Similarly, .org's share of total domains decreased between 2016 and 2023, see

¹⁹ See craigslist.org, coursera.org, and edx.org, respectively.

²⁰ See ncfiving.com, merckhelps.com, and navigatehousing.com, respectively.

Table 1A. The long-term erosion in .org registrations and share of registrations over the 2015-2023 period demonstrates the increase in competition from other TLDs. The recent stabilization in .org's share may well be due to PIR's decision to hold the .org price constant while the prices of many other TLDs have increased (see, e.g., Figure 7 below), making .org relatively more attractive than other TLDs.

Figure 6



6.1.2. PIR is a Not-For-Profit Entity

PIR is a not-for-profit entity. In contrast to a for-profit entity, PIR considers its goals to be the public interest, rather than profit maximization. In particular, PIR explained that "[w]e are different. We are mission based and not every decision is a financial one; we are not just driven by the 'bottom line.'"²¹ PIR views its role as one of "stewardship" and takes into consideration effects of its policies on the ".ORG Community."²² In its 2022 Annual Report, PIR stated that because it is "entrusted by millions to operate in the public interest," it

²¹ PIR, "An Open Letter to the .ORG Community," May 1, 2019, available at <https://thenew.org/an-open-letter-to-the-org-community/>.

²² Id.

“thoughtfully consider[s] the impact of [its] actions” and that it will not compromise its mission “for the sake of expediency, popularity, or profits.”²³

In May 2019, PIR publicly stated that “[r]est assured, we will not raise prices unreasonably. In fact, we currently have no specific plans for any price increases for .ORG.” In fact, PIR has not increased price since then, despite the substantial inflation that has occurred.

Given its public statements and actions, PIR’s status as a not-for-profit entity mitigates concerns that it would exercise any market power it might have to increase prices excessively.

6.1.3. The Price History for .org Supports the Conclusion That .org Does Not Have Substantial and Durable Market Power

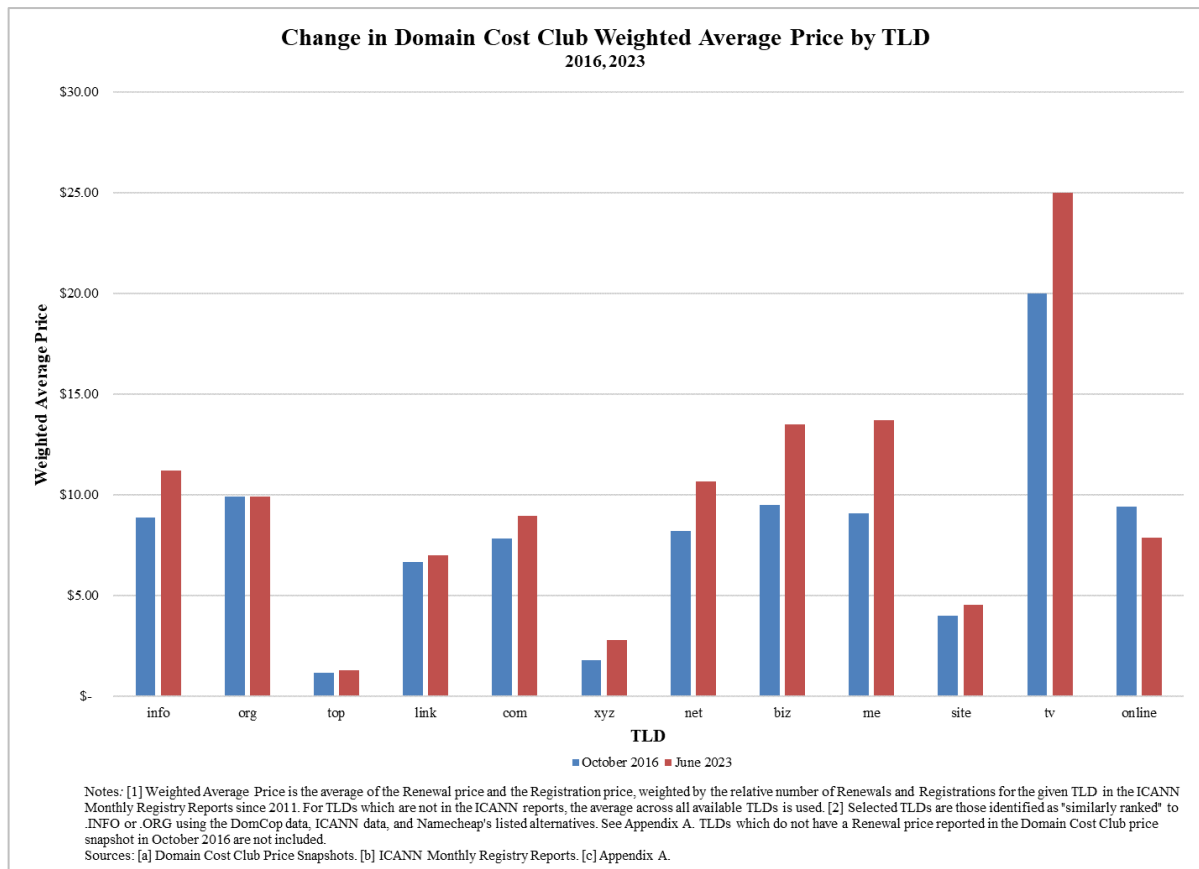
As noted above, the registration price for .org did not increase after June 2019 despite the lifting of the price control provision, which is inconsistent with what one would expect if .org had substantial market power and sought to exercise it. In fact, as also noted above, the .org price has been constant in recent years and thus has not even kept pace with inflation.

It is also useful to compare the .org price to that of other TLDs. In Figure 7, I display the October 2016 and June 2023 prices for a number of TLDs.²⁴ It is apparent that between 2016 and 2023, the .org price declined relative to many other TLDs for which either there is no claim of market power or, in the case of .com, has been continuously subject to a price control provision. Moreover, the absolute level of the .org price in 2023 is well within the range of these other TLDs.

²³ PIR, “Annual Report,” 2002, p. 4.

²⁴ The TLDs in Figure 7 were chosen using the methodology described in Appendix A. The October 2016 date was chosen because among the dates for which Domain Cost Club data are available, it is closest in time to, but prior to, the date when the .info pricing strategy changed.

Figure 7



Overall, the price history of .org supports the conclusion that .org has no substantial and durable market power.

6.1.4. The Price Lock Provision in the .org Registry Agreement Protects Against Any Exercise of Market Power by PIR

Even if one were concerned about .org having substantial and durable market power, there is another provision in the .org registry agreement that serves to protect from any exercise of that market power. Specifically, the registry agreement allows registrars, on behalf of their registrant customers, to register or renew .org domain names for up to a 10-year total registration term, at the then-current price (the "price lock" provision). Although registrars are not obligated to offer 10-year registrations, registrants can transfer their domain names to any accredited registrar that does. Thus, .org registrants can protect themselves against any excessive .org price increases charged by registrars by locking in the existing registration price. This further mitigates any concerns about potential .org market power.

6.2. .info Faces Competition From Other TLDs

.info does not possess substantial and durable market power because, as with .org, registrants have alternative TLDs to which they could turn if the .info registration price were set above the competitive level.

6.2.1. Registrants Have Many Alternatives to .info, and Increasingly Have Chosen Those Alternatives

No prospective registrant is limited to choosing .info as the TLD, but instead has over 1500 TLDs from which it can choose. The large majority of registrants choose TLDs other than .info. Currently, .info's share of domains is about 1.1% (see Table 1A above). A number of alternative TLDs, including .com, .net, .org, and .uk, have greater shares of total registrations than .info.

While some TLDs, such as .shop, have "semantic" meanings or interpretations that imply the nature of entities with SLDs on that TLD, .info does not have a single clear semantic meaning. Consistent with the lack of a single clear semantic meaning, a variety of different types of SLDs use the .info TLD. For example, new.mta.info is the website for New York's MTA (Metropolitan Transportation Authority) where riders can find schedules and plan their trips; javascript.info provides tutorials for learning JavaScript; and worlddata.info provides statistics on the geographies, populations, climates, and economies of countries around the world. Moreover, reviewing the advice that registrars such as GoDaddy and Namecheap provide to prospective registrants regarding TLD choice²⁵, there is no indication that the industry views .info as providing any substantial semantic or other type of benefit over other TLDs that registrants could choose.

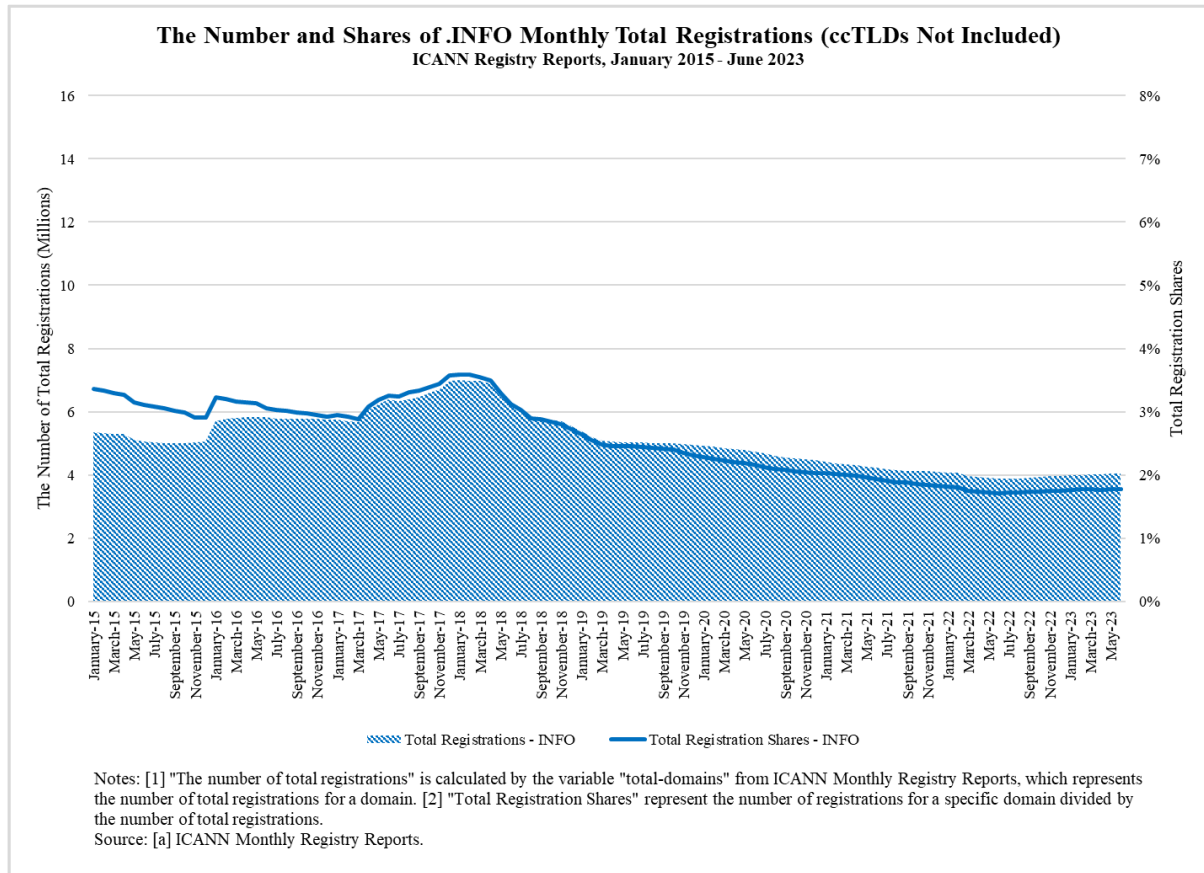
TLDs such as .com, .org, .biz, .net, .online, .site, and .xyz, as well as ccTLDs such as .uk and .io, are viable alternatives to .info for many registrants.²⁶ As a further indication of the alternatives to the .info TLD, it is useful to look at similar organizations where one uses the .info TLD and the another uses an alternative. Utilizing some examples from above, other transit websites for Minneapolis and the San Francisco Bay Area are metrotransit.org and caltrain.com, respectively. Additionally, javascripttutorial.net and learnjavascript.online provide tutorials for learning JavaScript. As a separate example, humanitarianresponse.info is the archived website for the United Nations Office for the Coordination of Humanitarian Affairs (OCHA), which has since been switched to their current website of response.reliefweb.int.

Not only does .info have a relatively low share of registrations currently, but also its share of total registrations, its share of gTLD registrations, and even its absolute number of registrations—has been declining over time as more TLDs have been introduced, see Table 1A and Figure 8.

²⁵ Namecheap's website states, "Although the .info domain extension was originally intended for informative websites, its use soon broadened to include many other uses. It can be used freely as an alternative to .com and the remaining registered gTLDs." Namecheap's website also lists ".info domain alternative[s]" such as .com, .net, and .io. See "Why choose a .INFO domain?," last accessed November 10, 2023, available at <https://www.namecheap.com/domains/registration/gtld/info/>. When searching GoDaddy's website for a particular .info SLD, if the desired SLD is taken, GoDaddy suggests alternative domains such as .online and .site, depending on the search term. See GoDaddy's search feature available at godaddy.com.

²⁶ It is not necessary for a lack of market power that every registrant have a viable alternative, as long as the registry operator cannot tailor the prices it offers to different registrants (which is the case here aside from differentiating between new and renewal registrations). The registry operator will be constrained by the marginal registrants—those registrants who would switch to an alternative in the event of a price increase.

Figure 8



The fact that .info has experienced a decline in its share and number of registrations is consistent with increased competition from other TLDs.

6.2.2. .info's Price History Supports the Conclusion That .info Does Not Have Substantial and Durable Market Power

The .info pricing history is also consistent with .info facing competition from other TLDs. As noted above, the .info weighted average price increases were in line with inflation over the long-term and were of smaller magnitude after the price control provision was lifted in June 2019 than one would have expected if .info had substantial and durable market power that the provision had constrained from being exercised.

In addition, the change in the .info weighted average price between October 2016 (prior to the change in .info pricing strategy) and June 2023 was in line with the price changes of other TLDs for which either there is no claim of market power or, in the case of .com, is subject to a price control provision, see Figure 7 above. Moreover, the absolute level of the .info weighted average price in June 2023 is within the range of these other TLDs.

These facts further support the conclusion that .info does not have substantial and durable market power, but rather that .info faces competition from other TLDs.

6.2.3. The Price Lock Provision in the .info Registry Agreement Protects Against Any Exercise of Market Power by .info

The price lock provision is an option available in .info as well. Therefore, if .info were to seek an excessive price increase, .info registrants could avoid any increase charged by registrars by opting to lock their prices at the pre-existing level. Again, this mitigates any concern about .info market power.

6.3. Concerns That Existing Registrants Would Be Targeted for Opportunistic Price Increases Are Unwarranted

A potential concern is that, while new registrants have many choices of TLDs, a renewing registrant is “locked in” to the TLD for which it already has a SLD due to costs of switching TLDs and thus is susceptible to opportunistic price increases by the registry operator and passed through by the registrar. That is, the registry operator could increase the renewal price without losing existing registrants because switching costs would prevent registrants from moving to another TLD to avoid the price increase. For a number of reasons, this potential concern is unwarranted.

As an initial matter, as noted above, the prices for a renewal and a new registration have been the same on .org since removal of the price control provision, in June 2019. Thus, .org has not attempted to engage in any opportunistic pricing to date. Moreover, there is no indication that .org has any plans to change its pricing structure in the future.²⁷

On .info, the price for a new registration is less than the price for a renewal. However, this pricing strategy does not appear to be an opportunistic price increase targeted at renewing registrations. Rather, it represents an attempt to generate additional registrations by offering a discounted “initial price.” Offering low introductory pricing is, of course, a common strategy in many industries. It is also common among TLDs. For example, .xyz, .team, and .site are just a few of the TLDs that use this strategy. The .info new registration price (currently \$2.50) is (1) lower than the registration prices of other TLDs that charge the same price for new registrations and renewals (e.g., .org is \$9.93 and .com is \$8.97) and (2) comparable to the prices for new registrations at other TLDs that charge different prices for new registrations and renewals (e.g., .xyz’s current new registration price is \$1.99 (the renewal price is \$9.15), .team’s new registration price is \$2.50 (the renewal price is \$23), and .site’s new registration price is \$2.59 (the renewal price is \$20).

In any event, concerns about reputation would deter any such opportunism or attempt to exploit switching costs. If .org or .info attempted to exploit registrant switching costs by imposing an excessive increase in the wholesale renewal price, they would gain a reputation for opportunistic behavior. This would cause new registrants to choose other TLDs that did not engage in opportunism. Thus, in considering whether to increase the renewal price excessively, .org and .info would have to consider not only existing renewals, but also the adverse effects such an action would have on the number of future new registrations (and the subsequent renewals associated with those future new registrations). Thus, even if some existing registrants would be deterred from changing TLDs due to switching costs, they are protected by new registrants who are free to choose any TLD and would be wary of TLDs with reputations for opportunism.

Moreover, the price lock provisions in the .info and .org registry agreements allow a registrant to enjoy a renewal for multiple years at existing prices. This provides an existing registrant with a further shield against opportunism on the part of .org or .info. If .org or .info were to attempt to increase the renewal prices, not only would they likely lose substantial amounts of new registrants to other TLDs from the resulting reputation loss, but they would also cause

²⁷ Moreover, as noted above, PIR has publicly stated that it will not seek excessive price increases.

existing renewing registrants to invoke the option to freeze the renewal price. Thus, an attempt by .org or .info to exploit switching costs to extract higher renewal prices from existing registrants would be a lose-lose proposition.

Finally, some existing .org and .info registrants do not in fact face significant costs to switch to another TLD and thus are not subject to opportunism in the first place.²⁸ Which existing registrants would have significant switching costs and which would not is not easily discernable and thus .org and .info would have difficulty identifying existing registrants that they could target for price increases.²⁹ Targeting is further hampered because .org and .info do not transact directly with registrants; rather they charge wholesale prices to third party registrars who then transact with registrants. Given their inability to impose targeted price increases, .org and .info can only increase the renewal price across the board. But, in that case, they would lose those existing registrants without significant switching costs, making the price increase a risky strategy even before considering the reputation effects discussed above.

In sum, concerns that .org or .info might attempt to exploit switching costs of existing registrants to increase renewal prices are not warranted.

6.4. Concerns That Registrars Would Be Injured By the Absence of the Price Control Provision Are Unwarranted

As noted above, a registry operator sets the wholesale registration price, while a registrar sets the downstream retail registration price paid by a registrant. The competitive and other constraints described above that protect registrants from anticompetitive increases in the wholesale prices of .org and .info similarly protect registrars.

In addition, the impact on a registrar of any wholesale price increase for a given TLD is likely to be minimal. First, a registrar has the incentive to pass on the wholesale price increase by increasing the retail price that it charges registrants for that TLD. By doing so, the registrar will maintain the spread that it earns over the wholesale price for each registration. Given that the registrar industry has numerous participants, is highly competitive, faces no significant impediments to changing retail prices, and all registrars would be subject to the same wholesale price increase, an economist would expect a wholesale price increase to be passed on to the retail price at a rate near 100%.³⁰

Moreover, the registrar is unlikely to lose many registrants as a result of passing on a wholesale price increase for a given TLD. Given that all registrars (that partner with the registry operator of the TLD) face the same wholesale price increase for that TLD and have a similar incentive to pass it on, registrants would not be able to avoid a retail price increase by switching registrars. They could avoid the retail price increase by switching TLDs (or, as noted above, exercising the option to lock in pricing at current levels for a 10 year period); but, as long as their existing registrar had a partnership with the new TLD, the registrar could retain the registrant's business on the new TLD.

²⁸ See, e.g., RockContent, "Top-level Domain: What it is and How to choose one," December 12, 2021, available at <https://rockcontent.com/blog/top-level-domain> ("...yes, you can change your website's top-level domain if you're running WordPress. It's also reasonably painless.")

²⁹ See J. Hausman, G. Leonard, and C. Velluro, "Market Definition Under Price Discrimination," *Antitrust Law Journal*, 1996 for a discussion of limits on a firm's ability to practice "price discrimination."

³⁰ Consistent with this expectation, in the arbitration between Namecheap and ICANN, ICANN's expert economist, Dr. Dennis Carlton, found pass on rates of near 100%. See Expert Report of Dennis W. Carlton, Ph.D., January 14, 2022, pp. 11-15; Reply Report of Dennis W. Carlton, Ph.D., March 14, 2022, pp. 4-28.

7. There Exists Little Reason for Concern That Competitive Conditions Will Change in the Future

Another potential concern is that, while the price control provision would have been superfluous for .org and .info in recent times, it might become relevant in the future. In evaluating this argument, it is useful to consider the factors that might cause the registration prices of .org and .info to increase in the future and whether the price control provision would be an economically appropriate response to such factors.

The first reason why the price of a product might increase is if the product's supplier faces an increase in the product's marginal cost. In such a case, the market's use of prices as signals and incentives to achieve economic efficiency would argue against using price controls. If the marginal cost of registration were to increase, the economically efficient outcome, entirely consistent with competition, is for a switch of buyer resources from registration to some other use. An increase in the price of registration provides buyers with the incentive to make this switch. Similarly, if the marginal cost of registration were to increase, it is economically efficient for registries to seek alternative lower cost means of "production." Again, an increase in the registration price provides incentives to the registry to seek such alternatives. The price control provision (which places a cap on price increases regardless of the reason for those price increases) would interfere with the efficient market responses to a marginal cost increase.

A second reason that the price of a product might increase is if the supplier increases the quality of the product. Again, use of price controls to cap price increases in this context generally will have economically adverse consequences. As noted above, prices serve as signals and incentives. A supplier will invest in product improvement only if the (expected) return on the investment—in terms of higher price or greater sales—exceeds the (expected) cost of investment. If there is a price control provision that would limit the amount the supplier could increase its price after a quality increase, that could cause the supplier to forego the investment opportunity. Because a higher quality product benefits users, that outcome will typically be economically inefficient. Innovation—even by a monopolist—tends to benefit both customers and the supplier. Price controls are counter-productive if they prevent price increases at the expense of quality improvements. This is why price controls that are superfluous are not harmless.

Prevention of malicious activities is one area where some registry operators have sought to improve product quality. Internet watchdog The Spamhaus Project provides rankings for the "TLDs with the worst reputations for spam operations" by tracking which domains are registered to professional spammers and malware operators, indicating there is differentiation among TLDs in this area.³¹ The Spamhaus Project also notes that even the "worst" TLDs "could, if they tried, 'keep clean.'" However, registry operators differ in resource constraints, infrastructure quality, effort, and technical knowhow, and thus differ in the extent to which they have been able to prevent malicious activities.³²

³¹ Spamhaus, "Understanding top-level domain (TLD) abuse helps illuminate and predict domain threat trends," March 23, 2023, available at <https://www.spamhaus.com/resource-center/understanding-top-level-domain-tld-abuse-helps-illuminate-and-predict-domain-threat-trends/>.

³² *Id.*

Third, a product's price may increase if there is a lessening of the competition that it faces, i.e., an increase in the supplier's market power.³³ However, there is no indication that .info and .org will face less competition in the future. In fact, the trend over an extended period of time is that .org and .info have faced increasing competition as new gTLDs and ccTLDs have been introduced and gained share of registrations. There is no reason to think that this trend will reverse in a way that would result in .org and .info gaining substantial and durable market power. Even if some current TLDs decline in competitive significance, ICANN can always allow additional new TLDs to enter, and in fact I understand that ICANN is in the process of preparing for another round of gTLD expansion. Moreover, there is little question that the strong competition from .com will continue to exist.

8. Conclusion

Because they interfere with the market mechanism that otherwise promotes economic efficiency, price controls are disfavored in market economies except in narrow circumstances where a firm has substantial market power with little hope that competition will arise in the foreseeable future. That is not the case for .info and .org.

In the four years since June 2019 without the price control provision in place, the registration prices of .info and .org have not increased by more than the price control provision would have allowed, as would have been expected if .org and .info had substantial market power. Rather, the historical experience without the price control provision demonstrates that other factors, such as market competition and PIR's not-for-profit status, have served to constrain the prices of .info and .org.

.info and .org have always faced competition from the largest gTLD, .com, and they have seen an increase in competition from other TLDs that have been introduced over time. Both .info and .org have a small share of registrations, and that share has declined over time as the number of alternative TLDs has grown.

There is little reason to believe this situation will change in the future as there is no sign that competition will dissipate, and I understand that ICANN is in the process of preparing for another round of gTLD expansion.³⁴ In any event, the ten-year price lock option protects against any excessive price increases on .org or .info.

The foregoing factors protect registrars as well as registrants from excessive wholesale price increases. However, in addition registrars have the incentive and ability to pass on wholesale price increases to retail prices without losing many customers. This provides further protection to registrars from any adverse impact of excessive wholesale price increases.

³³ These are the most important, but there can be other reasons that prices change. However, these reasons for price increases also would not warrant price controls. For example, when a firm faces uncertainty about demand, it may change price (or its pricing strategy) after obtaining new information about demand. This reason for changing prices is also entirely consistent with economic efficiency.

³⁴ ICANN, "The New Generic Top-Level Domains Program: Next Round," last accessed January 19, 2024, available at <https://newgtlds.icann.org/en/next-round>.

Appendix A

.INFO, .ORG, and Similarly Ranked Domains

TLD	Reason for Inclusion
au	Close in Rank to INFO (DomCop)
bio	Close in Rank to INFO and ORG (DomCop)
biz	Close in Rank to INFO and ORG (ICANN)
ca	Close in Rank to INFO (DomCop)
co	Close in Rank to INFO (DomCop)
com	Close in Rank to INFO and ORG (DomCop & ICANN), and a named alternative on Namecheap.com
cz	Close in Rank to INFO (DomCop)
de	Close in Rank to ORG (DomCop)
es	Close in Rank to INFO (DomCop)
fr	Close in Rank to ORG (DomCop)
google	Close in Rank to INFO (DomCop)
icu	Close in Rank to INFO and ORG (ICANN)
info	--
io	Close in Rank to INFO (DomCop), and a named alternative on Namecheap.com
link	Close in Rank to INFO and ORG (DomCop)
me	Close in Rank to INFO (DomCop)
net	Close in Rank to INFO and ORG (DomCop & ICANN), and a named alternative on Namecheap.com
online	Close in Rank to INFO and ORG (ICANN)
org	--
pl	Close in Rank to INFO (DomCop)
ru	Close in Rank to ORG (DomCop)
site	Close in Rank to INFO (ICANN)
top	Close in Rank to INFO and ORG (ICANN)
uk	Close in Rank to ORG (DomCop), and a named alternative on Namecheap.com
us	Close in Rank to INFO (DomCop)
to	Close in Rank to INFO (DomCop)
tv	Close in Rank to INFO (DomCop)
xyz	Close in Rank to INFO and ORG (DomCop & ICANN)

Notes:

- [1] TLDs are selected based on the DomCop rankings by frequency of domain names in the top 5,000, the ICANN Registry Reports by average monthly total domains registered, and TLDs stated to be an "alternative" to .INFO on Namecheap's website.
- [2] When using the DomCop data, TLDs are ranked based on the number of domains in the top 5,000. DomCop relies on the Open PageRank initiative to rank websites (or associated domains) according to the number and quality of websites that provide a link to the website.

Sources:

- [a] DomCop Domain Data.
- [b] ICANN Monthly Registry Reports.
- [c] ICANN Registry Listing Dates.
- [d] IANA Root Zone Database.
- [e] "Register your .INFO domain," Namecheap, available at <https://www.namecheap.com/domains/registration/gtld/info/>, last accessed 11/9/2023.

Appendix A

.INFO and Similarly Ranked Domains TLDs Selected Based on Top Domain Traffic and Average Total Monthly Domains

DomCop Top 5000 (Including ccTLDs)		DomCop Top 5000 (Excluding ccTLDs)		ICANN Registry Reports (Jan 2011 to June 2023)		ICANN Registry Reports (June 2019 to June 2023)	
Rank	(Domains)	Rank	(Domains)	Rank	(Avg Monthly Domains)	Rank	(Avg Monthly Domains)
12	ca (33); to (33)	--	--	--	--	--	--
14	co (30)	1	com (2,999)	1	com (133,036,899)	1	com (158,150,288)
15	es (22); io (22)	2	org (472)	2	net (14,711,584)	2	net (13,658,599)
17	me (20)	3	net (128)	3	org (10,813,486)	3	org (10,886,763)
18	info (19)	4	info (19)	4	info (5,166,984)	4	info (4,354,417)
19	us (17)	5	link (12)	5	xyz (3,208,250)	5	xyz (3,730,893)
20	tv (16)	6	bio (7); xyz (7)	6	top (2,402,762)	6	icu (2,510,829)
21	au (15); cz (15)	8	google (5)	7	biz (2,058,268)	7	top (2,454,647)
23	pl (13)	--	--	8	icu (1,295,452)	8	online (1,937,822)
--	--	--	--	9	online (1,256,116)	9	site (1,519,961)

Notes:

- [1] ccTLDs, are omitted from groups (except for DomCop Top 5000 - Including ccTLDs) prior to creating the ranking. US Government TLDs (.GOV, .MIL, and .INT), as well as .EDU are omitted from all rankings.
- [2] When using the DomCop data, TLDs are ranked based on the number of domains in the top 5,000. DomCop relies on the Open PageRank initiative to rank websites (or associated domains) according to the number and quality of websites that provide a link to the website.
- [3] When using the ICANN Registry Reports, TLDs which have no domains during or after June 2019 are omitted prior to creating the ranking. 'Average Monthly Domains' is the average of Total Domains for each month. Missing TLD-Months are treated as 0 if they fall between a TLD's first and last month of data, and are ignored if they fall outside a TLD's first and last month of data.

Sources:

- [a] DomCop Domain Data.
- [b] ICANN Monthly Registry Reports.
- [c] ICANN Registry Listing Dates.
- [d] IANA Root Zone Database.

Appendix A

.ORG and Similarly Ranked Domains TLDs Selected Based on Top Domain Traffic and Average Total Monthly Domains

DomCop Top 5000 (Including ccTLDs) TLD(s)		DomCop Top 5000 (Excluding ccTLDs) TLD(s)		ICANN Registry Reports (Jan 2011 to June 2023) TLD(s)		ICANN Registry Reports (June 2019 to June 2023) TLD(s)	
Rank	(Domains)	Rank	(Domains)	Rank	(Avg Monthly Domains)	Rank	(Avg Monthly Domains)
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
--	--	--	--	1	com (133,036,899)	1	com (158,150,288)
1	com (2,999)	1	com (2,999)	2	net (14,711,584)	2	net (13,658,599)
2	org (472)	2	org (472)	3	org (10,813,486)	3	org (10,886,763)
3	fr (175)	3	net (128)	4	info (5,166,984)	4	info (4,354,417)
4	net (128)	4	info (19)	5	xyz (3,208,250)	5	xyz (3,730,893)
5	de (104)	5	link (12)	6	top (2,402,762)	6	icu (2,510,829)
6	ru (68)	6	bio (7); xyz (7)	7	biz (2,058,268)	7	top (2,454,647)
7	uk (62)	--	--	8	icu (1,295,452)	8	online (1,937,822)

Notes:

- [1] ccTLDs, are omitted from groups (except for DomCop Top 5000 - Including ccTLDs) prior to creating the ranking. US Government TLDs (.GOV, .MIL, and .INT), as well as .EDU are omitted from all rankings.
- [2] When using the DomCop data, TLDs are ranked based on the number of domains in the top 5,000. DomCop relies on the Open PageRank initiative to rank websites (or associated domains) according to the number and quality of websites that provide a link to the website.
- [3] When using the ICANN Registry Reports, TLDs which have no domains during or after June 2019 are omitted prior to creating the ranking. 'Average Monthly Domains' is the average of Total Domains for each month. Missing TLD-Months are treated as 0 if they fall between a TLD's first and last month of data, and are ignored if they fall outside a TLD's first and last month of data.

Sources:

- [a] DomCop Domain Data.
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- [c] ICANN Registry Listing Dates.
- [d] IANA Root Zone Database.

Appendix B

Materials Considered

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Materials Considered

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