'FREE' SERVICES ON THE NET: MOVE FROM BARTER TO MONEY

Rakesh Shrivastava
Professor, Goa Institute of Management
Goa Institute of Management, Poriem, Sattari, Goa.

ISSN 2277-7733
Vol. 10, Issue 1,
June 2021

Abstract

Consumers routinely use 'free' services on the web by accessing these from laptops and mobile. These services are actually paid by the user's time, attention, and data. Consumers depend on regulators and authorities to protect their interests. The barter trade of service can move to a system of money, say 'Cyberdollar'. Whenever a service is used, the consumer of service shall pay Cyberdollars for the services used. Service-provider shall pay Cyberdollars to the consumer for their time spent, attention and for data. A Cyberdollar-based marketplace for web services shall be more efficient and vibrant than the present barter system. Consumers shall be able to influence the price of various services based on utility and quality, and service providers shall be able to optimize their earnings by dynamic pricing of services offered. Consumers shall have a choice of gracefully opting out of services, and service providers may seek compensation for loss of business. Cyberdollars may emerge as the most powerful currency used all over the globe for transacting on the world wide web.

Keywords: *Access to world wide web, Free web services, Prices of web-based services, Virtual currency*

Long ago, hidden in the haze of history, mankind discovered trading. Both the seller and buyer are better off after the trade! To begin with, all trade was barter. Things like cacao beans and shell beads were used as a common medium for barter (Bower, 2019). Later, silver and gold were used, and we had money. The origin of money as a direct result of barter is debatable (Soldatos, 2018). The backing of state for giving credibility, using money as a means for taxation, and as means of borrowing and lending may have led to the concept of money. Borrowing and lending also led to the concept of the interest, and defined benefit of holding money. Money is in existence since possibly 3000 B.C. and by now it is an integral part of our lives. There is no doubt that trading is far simpler with money.

Money has changed its form, as it evolved, from a piece of gold to a gold coin with the king's insignia to paper. With the advent of technology options, money took the form of plastic, and later of only bits of information, recorded somewhere and accessed from your laptop or mobile phone. Money is now a powerful and virtually the only medium of exchange and measure of values of all goods and services. Of course, community and government may provide common facilities that could be used without immediate payment. These public goods are funded by community/taxpayers' funds, and the provider of a public good is not looking to making a profit. Let us compare it with another everyday scenario; today, we reach for our laptop or smartphone and routinely use a

service without paying for it, but we know this is not a public good. Moreover, by your using the 'free' service, a big tech company, as the service provider, makes big money. But there is no exchange of money from user to service provider. Transaction is, of course, mutually beneficial. So, how do we measure the value of service used? Are we in a primitive barter era? Scholars, industry-watchers, and society-at-large have examined various aspects of these 'free' services.

Literature review- 'Free' services on web

Successful transition from barter economy to fiat (paper) money economy relies on credibility of regulatory authority (government) issuing the fiat money, and ability of the government to regulate supply of fiat money and patiently manage the transition. (Ritter, 1995). Since World Wide Web is an 'economy' spanning virtually the entire globe, definition of regulatory authority becomes harder. Digitization is said to be creating a second economy, with intercommunication, exchange of information, and completion of a business transaction electronically, with very little human involvement. Physical economy and human activity are connected to and depend on smooth functioning of 'second' (digital) economy. (McKinsey, 2011). It leads to the question: Would digital economy benefit by a currency of its own? Can currency arrest trend of creating walled gardens of ecosystem of a single service provider? A decade ago, the inventor of internet (Berners-Lee, 2010) expressed concern stating that 'some of the most successful inhabitants' of the web 'have begun to chip away at its principles' A currency can facilitate assigning value to information collected by service-provider, obviating need for walling.

Offers of free internet access to selected contents have been disallowed by regulatory authorities to uphold principle of net-neutrality (Manne, 2016). This move might have deprived some of the poorest users, a chance to have access to the world of information. Would a pricing mechanism help in such situations? Free services widely available on net have numerous non-pecuniary costs (Hoofnagle and Whittington, 2014) and may be denied legal protections available as consumers. Authors advocate free service providers offering an explicit paid option to users, with safeguards for privacy of data, and legal rights of a consumer. Setting a price pre-supposes estimating costs for each user or category of users. With ability to search quickly, the web has boosted barter, with users looking for exchange possibilities- the classical 'double-coincide' of wants. (Rice, 2003). A measure of value of services under barter can help both the parties in estimating fairness of barter, they are entering. A consumer pays by spending her time on internet. Time costs are much higher than monetary costs, and consumer gain has been estimated using opportunity cost of people's time. (Goolsbee and Klenow, 2006). Authors estimate consumer surplus from the internet maybe around 2% of full-income, a significant figure of several thousand dollars per user. Estimating the size of attention economy of free

digital services Brynjolfsson and Oh (2012) reckon consumer surplus to be $100 billion per year for the US in 2007-2011. Can this economy become more efficient if a currency is used, instead of prevalent barter?

Information technology giants offering free services- Google and Facebook- wield so much influence that a case is made to regulate them as public utilities. (Simons and Ghosh, 2020). At the time of writing this paper, anti-trust proceedings have resulted in filing of a complaint under Sherman act against google (Government of US, 2020) noting that "American consumers are forced to accept Google's policies, privacy practices and use of personal data". For these services' consumer-users have no means to influence, as not only the technology of algorithms, but even the metrics are available only to service-providers and not the consumer. Ability to measure utility of a service can provide a consumer an opportunity to explicitly express an opinion on the service by buying it at a particular price-point.

Hypothesis – 'Cyberdollars' to buy 'free' services

Let us examine the business of tech companies operating in the cyberworld, where in exchange for access to a digital good, consumers can offer money, information (such as personal data), or time (often in the form of attention). Unlike money, information and time need to be used by tech company offering digital goods, and cannot be easily transferred. If what we are doing is barter, logically we should move to more sophisticated money-based trading. Introducing money will have the benefit of the ability to measure the service and compare different services provided by different tech companies, possibly earn money on the platform of one service-provider and use it elsewhere, somewhat similar to using frequent flyer miles for a hotel booking. Has the time come to invent money? Let me call it, Cyberdollar. Is it the shell bead of today, or, a gold bar? Why do we need the gold bar? The fact of the matter is that the service you use could be paid for by dollars or by the user's time, attention, and data, or sometimes by a combination. Users watch advertisements and provide data about themselves while using a free service, which is used by tech company making the offering. Business models of services fueled by users providing data are already thriving and we are looking for the ideal win-win (Lambrecht *et al.*, 2014). A price suited to each consumer shall be good for both industry and consumers. Will it be possible with Cyberdollars?

Thought experiments- validating hypothesis

A consumer shall earn Cybercents by merely visiting a website. Imagine you drove past a billboard on a street, the advertisement you saw appealed to you and you earned two cents, as well. The concept is simple. The user looks at the ad, using their laptop or smartphone and a few cents gets added to their Cyberdollar account. The advertiser pays the consumer for 'consuming' the message in the advertisement. The complication lies in determining whether the user actually read and paid attention to the ad, or looked the other way, and

visited the site only to earn a few Cybercents, or, more likely, that a software tool is used to imitate the steps and earn without anyone actually reading the ad. In some cases, a user may not wish to be identified and use a software service as a guest. The service provider may still like to pay the user a few Cybercents for the ad, but does not know whom to pay. To earn Cyberdollars, there may be some pre-requisites. Each consumer will have an identity. An e-mail ID is a convenient identity. Each laptop and smartphone will have an 'owner' identified by their e-mail ID. While using a software service, the users can decide, by a single keyclick, whether they wish to be identified or go by the default e-mail ID for their device or continue as an anonymous guest. An advertiser may pay, let us say, half a Cybercent if the user is an anonymous guest, one Cybercent if they disclose who they are, and two Cybercents if they 'like' the ad. The advertiser may establish checks, such as a super quick picture recognition, to verify that the ad is consumed by a person, and not a software. Thus, if you skip the check, you may not get your Cybercents. Since consumers' time is precious, tech companies shall devise clever ways to quickly verify the fact that an ad is consumed by a human; however, who knows, someday providers may like to pay even if an advertisement is consumed by your virtual assistant. If the concept of Cyberdollar gets accepted and gains popularity, users' devices may have options to skip any checks, always assume any use is done by that user, or, authenticate usage by a biometric measure, such as fingerprint or face recognition. Users may even have a list of regularly used 'trusted' websites/services, and more stringent verification needs for others. The fundamental point is that users earn Cybercents for each 'consumption' of an advertisement/message if they choose to disclose their identity.

How to earn and spend cyberdollars

A user may be able to decide a price for her time through the settings in her laptop and e-mail ID. It may be a one-time setting something akin to a cookie. The user may decide a price for some selected services and a default value for others. There will a price for time spent counted in Cybercents per minute, and a price for sharing your identity. Obviously, each software service will have a logic to determine if the price demanded by the consumer is acceptable. If consumers price themselves too high they may not earn any Cyberdollars. Alternatively, if the price is too low, they may be inundated by advertisements. The user may price her time differently for different websites/services, perhaps by appropriate settings for services identified by the user, and a default value. Taking this concept further, the user may vary prices for their time based on the time of the day, day of the week, and even the someday based on their mood at the moment, as seen by their virtual assistant looking at their face through the camera of the user's device and actions on their keypad.

Cyberdollars earned will get stored in a cyber account. The main question for the user is: What use is that? What can they buy using Cyberdollars? Let us think

of some possibilities. To begin with, the service provider shall pay Cyberdollars for the ads consumed, time and attention of a user, and for sharing of personal data; and shall charge Cyberdollars for services provided, which may be measured by connect time, clicks, volume of data accessed etc. Existing 'barter' can be viewed as if a consumer is earning and spending exactly the same amount of Cyberdollars each time she uses a service. Since every Cyberdollar earned is spent immediately, there is no need or possibility of storing Cyberdollars. Nonetheless, as the market evolves, a consumer may be able to earn more Cyberdollars than she spends for the service. Cyberdollars saved may be available to the consumers, which they may use to buy something, such as software or apps. It could be used for membership of a 'free' service, priced at x Cyberdollars per month, or, y Cybercents per words posted by the user, or z Cybercents per minute of the time used. These prices could be dynamic and vary depending on the time of usage and the user's profile, for example, a celebrity consumer may even get paid for using a service rather than paying for it. Perhaps a user could buy something more tangible, say a piece of music or an e-book.

The existence of Cyberdollars, norms, and mechanisms for earning and burning of Cyberdollars shall conceivably lead to an ecosystem of Cybermoney, moving from today's barter, and later to full-fledged money. Will a user be able to earn interest on accrued Cyberdollars? Will a user pay interest and borrow Cyberdollars? Who will be the regulator for managing the policies for Cyberdollars?

For the ecosystem of Cybermoney to succeed, it shall be international, cutting across national boundaries, be acceptable to all, or almost all big tech companies, enabling consumers earning by ads, and targeting consumers based on their profile. Looking at it from the perspective of tech companies, Cyberdollars ought to provide greater opportunity to earn than the present barter system. Service providers may price each search or posting or even access such that an average consumer earns a little less than what they spend on a single interaction. The consumer may resist it and price themselves higher. Tech companies shall use algorithms to determine price, and Cyberdollar paid or earned for any given service that can fluctuate every second, similar to that of stocks or currencies. There could even be norms, possibly laws, regulating the prices of a consumer's time and identity data, placing lower and upper limits, as in minimum wage regulations. In the beginning, big tech companies are likely to choose prices so that Cyberdollars paid by an 'average' consumer for 'average' services are likely to match the Cyberdollars earned by a consumer for 'average' time and identity data. This pricing will maintain continuity from the present 'free' services or more accurately, services in lieu of the user's time and personal data.

One crucial challenge shall be the use of common currency, by all service-providers. Over a while, a consortium of industry players may emerge as

regulator-custodians of Cyberdollars. To begin with, there may be multiple competing currencies.

Let us look at a successful model, we all are familiar with. A private company issues stock. It can be traded. There are established methods for valuing a private company and its stock. We have a working legal framework for private companies. Public companies also issue stock and operate under the applicable legal framework. Availability and trading of stock of publicly traded companies bring in a substantially higher degree of dynamism and vibrancy in the market, and its impact on the public company. Management of a public company considers the impact on the stock price for every decision taken by them. Easy and quick trading on the stock market gives to the investor, the ability to switch stocks, based on their assessment. Similarly, the concept of measuring the value of services by Cybercents paid to use a service, and reward for the time, attention, and data by Cybercents earned may bring the type of dynamism and vibrancy provided by stock exchanges to publicly traded companies. Acceptability of a common currency, that is every tech company using Cyberdollars, rather than Cybereuros and Cyberyens, shall provide flexibility to every user, similar to an investor switching investment in the stocks of publicly traded companies with ease. Of course, we can imagine the conversion of Cyberdollars to Cybereuros, and flexibility to switch becomes a two-stage process, albeit a slightly more complex one.

Since the e-mail and laptop or mobile identifies the user, the support of the providers of e-mail services and devices will be crucial. Possibly, these companies may earn a small fee every time the currency is used, similar to credit card providers of today. Some of them may offer large discounts, to market their services.

Devices shall have a purse for safekeeping of Cyberdollars, and possibly another for keeping Cyberyens. These purses shall have the facility to put in Cybermoney when the owner earns it by giving their time/attention or data to a service provider. Similarly, purses will be able to pay out Cybermoney when the owner uses a service. Adding in and paying out Cybermoney shall be done by service-provider, as agreed with the owner of the purse; a transaction not very different from updating a cookie. Some service-providers may allow negative balance in a purse for selected consumers, like banks giving an overdraft to its customers, and for this, may charge interest on the overdraft allowed to the consumer.

As of now, we have the barter system, where a user can use services, 'pay' by giving their time and attention, as the service-provider also collects some data about them. The usage of data is governed by norms and regulations. When we introduce the concept of Cybermoney, the challenge we face is: What if a consumer runs out of Cyberdollars, and wants to use a service, or, they may choose to prevent any invasion of their privacy and not disclose anything about themselves. Service-providers are unlikely to opt to deny service to such

consumers. Paying by real dollars into their bank account is one possibility. Services may have expensive 'paid' options, and some of them may have emergency options for specified limited use without any payment, like smartphones.

A consumer with extreme reluctance to share data, may not disclose an e-mail ID. Since each device has a unique identity, and each device has a defined owner, the device may divulge the identity of the consumer. To avoid such unintended identification, a device may have a setting for 'unidentified device- send- my earnings to charity'. On the other hand, a consumer may like to share their full profile and earn as much as possible. For such consumers, a device may have an option to fill out a form, or better still, get the user's virtual assistant to fill in the form, and choose the services for sharing various details.

Premiums and discounts

Cyberdollars open up the cyber equivalent of rent or buy options. A consumer shall choose the period for they want a service, and consumers shall see service providers putting up a menu from long-term (3 years) with 'free' version upgrades to free trial for a week offers. A consumer may choose the price for themselves by allowing selected access to their details and a carefully selected pattern for ads for their long-term service providers; no details and no ads for any free trial services. The choice is important and will lead to greater vibrancy in the cyber market-place.

Service providers can benefit by combining different sets of data for the same consumers for precise targeting. In the barter world of today, this brings no direct benefit to the consumer. The interests of consumers have led to regulations to ensure a sense of balance. Cyberdollars allow consumers to decide what they want to disclose and to whom, including discerning between the data shared with a service in the course of using it, data explicitly shared by the consumer herself, and data available with another service. Consumer may earn more if they are willing to share more about themselves, and click 'use my data wherever you can find it', which will result in jacking up their earnings.

A consumer may decide to discontinue using a service- they 'unsubscribe'. They may like the service provider to remove all data from their records- the user wishes to be forgotten. Except for celebrities and public figures, the right to be forgotten is usually recognized as part of protecting the privacy of individuals (De Baets, 2016). Service providers may have the right to archive anonymized data, but they should confirm that they will not use it for furthering their business. For potential loss of business, a service provider may charge a fee for forgetting a consumer, possibly based on how long she has used the service. Industry norms and regulations will emerge as the business model matures. Dissatisfaction with the quality of service will be a greater challenge. Will consumers have recourse to remedies if they are dissatisfied or if they think their right to be forgotten has been violated by a service provider. Regulators and

authorities will find assessing the extent of damage easier in Cyberdollars-based monetary trade, as compared to today's barter system.

While a really dissatisfied consumer may decide to unsubscribe and discontinue a service, such drastic actions shall be infrequent. More likely are user reactions ranging from 'Wow, I am thrilled' to 'Not quite up to the mark, but will do'. Cyberdollars shall facilitate the capturing of these responses, by varying consumer payments within a given band, so that consumers can provide feedback, as well as, service providers earn more if the service quality is good.

For a consumer, the Cyberdollars saved is pin money earned if she is careful and clever in using the web services, whereas, for the tech companies, it is the source of business earning, for which, they have to work out their business model carefully. Also, tech companies shall expect that execution of the actual business transactions, say Cyberdollars charged per second of connect time, and Cyberdollars paid for showing a targeted advertisement for twenty seconds, ought to be carried out without human involvement. In other words, the business model, essentially the basis for charging and paying Cyberdollars shall be built into an algorithm. Of course, for a tech company, the total Cyberdollars earned minus Cyberdollars paid ought to have a balance, such that the company does not slip into irrecoverable Cyberdollar debt. In a stable state, a mature tech company may have a small number of privileged customers earning more than what they pay to the company, while the bulk of customers may pay a little more than the Cyberdollars they earn. A popular tech company would like to maintain an image of being stable and predictable, and changes to business models shall be few and far between. Accordingly, the tech companies may offer multiple Cyberdollars pricing plans for their 'free' services, with varying opportunities, and multiple options to earn Cyberdollars. We can imagine, some companies may offer incentive schemes designed to attract many consumers and of which, only a few may actually benefit from the incentives offered. Naturally, Cyberdollars charged shall be based on services rendered. The simplest form could be a fixed charge for a period. A tech company shall have a wide choice for imaginatively pricing its services, and we can be pretty sure that novel pricing patterns will emerge, possibly with a variety greater than the e-commerce pricing models in use now.

For example, a service may have a price for a casual individual user, and a higher price for professional, or business user, with the agreed standard of assurance of quality, accuracy, and verifiability. The commercial gain for a service provider shall depend on number of services rendered. This may lead to a possibility of an unscrupulous service provider passing off 'fake' services to make money. Over a longer period, we shall find independent certifiers and auditors to verify services consumed; and possibly warranties issued for audited service quality.

The use of Cyberdollars can result in ongoing improvement in service quality, enforcement of guarantees with automatic and quick penalties for a decline in

service quality. Further innovations in processes and technology, as we see in Fin Tech shall lead to greater maturity and efficiency resulting in universal acceptability of Cyberdollars (Wonglimpiyarat, 2017).

Can it be real money?

If and when Cyberdollar usage reaches a critical volume, we shall encounter the big question of converting Cyberdollars to real dollars and vice-versa. If there is no legitimate way of conversion, we shall witness a grey market with all its imperfections and infirmities, whereas if the conversion is as easy as say, euros to dollars, regulations for Cyberdollars shall have to be at par with real currencies, with sophisticated processes for exchange, and an entire range of banking mechanisms such as base interest rates, and reserve requirements. Would Cyberdollars emerge as a virtual currency, usable across national boundaries? (Baron *et al*., 2015). There is a danger of Cyberdollars getting used for nefarious, or, criminal acts; and, greater difficulties in case of varying interpretation of what is a crime amongst transacting parties in a cross-border exchange. There is a need for a banking regulator, able to manage a currency with the potential for being the most powerful currency. Can a banking regulator exist without government backing shall be the moot point? One possibility is to mandate an upper limit for Cyberdollars for each device, placing a ceiling on total Cyberdollar funds, and thus the impact Cyberdollars can have on the total economy. In the unlikely occurrence where a super-efficient consumer can earn a lot of Cyberdollars without spending enough, they would simply lose their earnings beyond a set limit, thus incentivizing them to spend more and signaling to service providers the possibility of a correction to their pricing algorithm. As the concept catches on, funds in Cyberdollars grow, and regulatory frameworks evolve, the limit shall move up, leading to convertibility from Cyberdollars to real funds, and ultimately the disappearance of Cyberdollars as a separate entity. At the time of the introduction of Cyberdollars, moving from the present barter system, there could imbalance in earning and spending Cyberdollars. A tech company with understanding and wherewithal to run a business may be able to cope with a deficit or surplus of Cyberdollars if there is no possibility of converting real dollars to Cyberdollars and vice-versa. For example, a tech company with surplus Cyberdollars may either discard them, that is these bring no benefit to the tech company, or reduce the price of services and aim for a larger customer base. Similarly, a tech company, whose Cyberdollar earnings are less than the Cyberdollars spent may choose to try a higher price for their service, or, aim for higher future earnings to offset the current deficit.

However, individual consumers shall need Cyberdollars for the services they desire to use, at the point of time they wish to use the service. Tech companies may either provide a version of a service without any Cyberdollar charge, but with an overload of advertisements, and possibly demand of personal data, or, provide emergency services by giving access to a 'light' version. Some tech

companies may give a choice of both an absolutely free version with an overload of ads, and a light version for emergencies and quick use.

There is a dangerous possibility hidden under the lure of earning of Cyberdollars. A 'consumer' with no interest in using a service may repeatedly use a service only to earn Cyberdollars. Similarly, service providers may claim absolute intellectual rights on data paid for by them, and may use it for purposes far beyond expectations at the time of procuring it; mostly aided by later developments of technology with greater capacity for data crunching. We can expect a code of conduct to evolve pledging data usage as per settled terms, and seeking of consumer consent for newer exploitation opportunities, even if the consumer is no longer an active user of the service; besides of course, in the case of the right of the consumer 'to be forgotten', if they so desire.

Inference- beginning of new era

Introduction of Cyberdollars shall alter the 'free' services marketplace by users getting the power to earn Cyberdollars from one service-provider and spend it on another. Of course, Cyberdollars shall require security and traceability of transactions, like present-day banking systems, perhaps even stronger. Designing a system for secure handling of Cyberdollars would be a challenge. The system for handling of Cyberdollars may be built using advanced technology such as blockchain and proper encryption, supported by non-repudiable identification. Our experience with storing of currency and money storage and payments from mobile phones shows that mobile money, with minimal regulations, complements real money (Nair and Emozozo, 2018). Such experiences shall be useful in working out the framework for Cyberdollars.

We already have lots of experience of handling money electronically, carried out in multiple ways, including the legal and ethical aspects of handling money (Angel and McCabe, 2015). Although, almost all of it is powered by businesses with a deep understanding of the handling of funds, banking, and appropriate laws and regulations. Tech companies may begin using Cybermoney with the promise of greater user convenience and speed. Would we work with real dollars held or exchanged electronically as well as the Cyberdollars, especially if there is a possibility of changing one to another, even to a limited extent? A consumer may find two different kinds of dollars bothersome, and slowly the distinction may get blurred and eventually disappear. However, to begin with, a 'free' service remains free, Cyberdollars only provides a measure for service providers and consumers to conveniently compare their 'give' and 'take' and bring vibrancy to the marketplace. We are moving from shell beads to money. The conversion of Cyberdollars to real dollar shall be the equivalent of setting up money changers to convert pounds, yens, and francs to dollars.

Conclusion

Tech companies have encompassed larger and larger space in our daily and professional lives through the services offered by them- both explicitly priced

and 'free' services paid by user's time and data. Increasing, the importance of web-based services has led to close examination of these companies by governments, regulators, and civil society. Regulatory authorities in various countries are taking measures to protect the interests of consumers by introducing legislation, directives, and one-time actions (Tuttle, 2018; European Commission, 2019). Consumers have very little direct influence. Cyberdollars shall offer greater opportunity for direct consumer feedback, and shall enable regulators to check the track record of service prices and spot unfair practices.

The beauty of the cyberworld is its global presence manifested in connecting businesses and consumers across geographies and governed by multiple political and legal philosophies. Even finding a name for Cyberdollars which is acceptable to most consumers shall be a challenge. Of course, when we enter an unchartered path, there shall be unexpected challenges. Think of the introduction of the first coin, limited to a small community. Cyberdollars can begin with a few leading tech service providers and economies agreeing to a common framework, and then it shall evolve and grow. The law and society have learned to deal with the world wide web, is learning to deal with driverless cars, and if the first bold step is taken, we will learn to use and benefit from Cyberdollars, as well.

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