

Taxation in the Digital Age

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Abstract

During the last few decades, we have witnessed the advent of Personal Computers, the Internet, and Social Networks. In turn, these technological innovations have been incorporated into areas of private and public finances. Technological advancements have made the revenue and data collection, auditing, and fraud detection easier, less expensive, and more efficient. But this is only the beginning stage, recent digital innovations will further impact the behavior of the taxpayers as well as the various taxing authorities. The incorporations of these innovations such as the blockchain and the cryptocurrencies technologies will create challenges and opportunities for tax collectors and taxpayers alike. Anticipating what the future holds is a tall order. Our analysis focuses on four distinct aspects of a tax structure that would play an outsized role on the influence of the digital revolution on tax policy: Increased transparency, privacy, an efficient income redistribution and the better incentive structure is the promise of the digital revolution. Transparency and efficiency lead to a broader and flatter tax which combined with an income base transfer program is able to replicate the progressivity of the current tax code while lowering the economy wide marginal tax rate and reducing the size of the government redistribution program. In short, it promises a lower tax rate, a smaller and less expensive social safety net program that meets all of the existing obligations and an increased incentive to work, save, invest and produce.

Keywords

Flat Tax, Taxation, Blockchain, Income Redistribution, Transparency, Efficiency

1. Introduction

During the last few decades, we have witnessed the advent of personal computers,

the internet, social networks, cloud computing and artificial intelligence.¹ People use their personal computers or mobile devices to access the Cloud where they store personal information, not surprising the market filled a perceived void. It developed software that allows people to compute their taxes. The first tax preparation software appeared in 1980. Turbo Tax and H&R Block's TaxCut were among the pioneers, [Intuit Inc \(2013\)](#) and [Johnson \(2023\)](#). Tax software evolved into a super friendly application that included guided interviews, error detection, and integration with financial accounts, [Arthur \(2005\)](#). Programs like Quick-Books (Intuit) and Sage began integrating tax tools into general accounting software. Cloud-based tools enabled real-time access to financial data for tax filing. This development ushered a shift towards cloud-based tools, [Buyya, R., Broberg, J., & Goscinski, A. M. \(2010\)](#). The rise of mobile tax filing apps allowed users to submit returns via smartphones, [Deloitte Insights. \(2018\)](#). The incorporation of AI into modern accounting apps for automatic data entry, error detection, and optimization of deductions. It has proven to be quite useful, studies highlight how tax software improved accuracy, saved time, and reduced reliance on manual calculations ([PwC, 2020](#); [Forbes, 2019](#); [National Taxpayer Advocate, 2019](#)). All these developments have allowed people to file their taxes online. For many, the process is faster and cheaper than going to an accountant. The benefits of E-filing have been faster processing, reduced errors, and improved fraud detection.

The private sector was not the only one taking advantage of the technological developments already mentioned. The IRS began using computers in the 1960s to process tax returns and analyze data to detect anomalies, [IRS \(2025\)](#). In the 1980s, the IRS developed the Discriminant Function System (DIF), a computerized algorithm to score tax returns for audit potential ([IRS, 1988](#)). The DIF identifies inconsistencies in reported income, deductions, and credits, helping prioritize audits. Then in the 1990's the IRS developed technology to compare reported income with data from employers and financial institutions ([GAO, 1995](#)). As the technological innovation progressed, the IRS continued to adopt innovative technologies and to innovate, it introduced electronic filing in 1986 as a pilot program to streamline return submissions ([IRS, 1986, 2012](#)). The shift to e-filing enhanced

¹A brief selection of works that are foundational for understanding the progression of these technologies. On Personal Computers, see [Ceruzzi, P. E. \(2003\)](#), [Freiberger, P., & Swaine, M. \(2000\)](#) accounts, on the Internet, see [Abbate, J. \(1999\)](#) and [Naughton, J. \(2000\)](#). On cloud computing see [Buyya, R., Broberg, J., & Goscinski, A. M. \(2010\)](#) and [Mell, P., & Grance, T. \(2011\)](#).

In turn, these technological innovations have been incorporated into many areas and have been instrumental in the development of social networks, see [Van Dijck, J. \(2013\)](#) and [Boyd, D. \(2014\)](#). Social networks reshaped communication, marketing, and politics. An issue documented in [Shirky, C. \(2008\)](#) and [Castells, M. \(2012\)](#). Facebook revolutionized social networking with its scalability and real-name policy, [Vogelstein \(2007\)](#). In turn, the market developed specialized networks such as LinkedIn which focused on networking and career-building [Kirkpatrick, \(2010\)](#), and *Twitter* which introduced microblogging and real-time updates, [Johnson \(2009\)](#).

Many of these developments were accelerated by the interaction with other technological developments simultaneously taking place. For example, the mobile revolution led to the rise of smartphones which accelerated platforms like Instagram, Snapchat, TikTok, see [Bucher \(2012\)](#) and [Zhang \(2021\)](#). Then there is the development of machine learning algorithms that the social networks used for content recommendations, advertising and user engagement, [Gillespie \(2014\)](#).

audit efficiency as digital submissions enabled real-time error checks and automated flagging systems, *National Taxpayer Advocate*. (2010). As the technology trend continued, the IRS adapted, it now employs AI-based systems and machine learning algorithms to identify audit targets and detect tax fraud more accurately (IRS, 2022; TIGTA, 2021). These references provide a historical and modern perspective on how the IRS has leveraged technology to improve its processes. A compelling case can be made that technological advancement have made the revenue and data collection, auditing, and detection easier, less expensive, and more efficient. But this is only the beginning stage, recent digital innovations will further impact the behavior of the taxpayers as well as the various taxing authorities. These innovations will create challenges and opportunities for tax collectors and taxpayers alike. However, anticipating what the future holds is a tall order.

2. A Technological Leapfrog?

In the context of a fiscal policy initiative, the emerging market countries have an opportunity to leapfrog some fiscal policy development and take advantage of all of these technological innovations. The analogy here is similar to cell phones and land lines. Many of the poorer economies and poor people in some of these economies have bypassed the use of land lines and have leapfrogged and moved directly to using cell phones. Society is now better off as a result of the leapfrog or at the very least is better connected. The question then becomes what happens to these economies as they leapfrog the historical implementation of taxation and social safety net combination and move directly to the implementation of the latest technology. While we do not know the path that the digital revolution will take tax policy, we have some insight as to what impact blockchain technology could have on tax related matters. We believe that blockchain technology is going to be at the epicenter of the digital revolution. Before we get to the discussion of the impact of blockchain technology, it is important to get a sense of what blockchain technology is all about.²

²The blockchain or distributed ledger is the brainchild of a person or group of people using the pseudonym, Satoshi Nakamoto (2008). It is a digital ledger of time stamped transactions that can be programmed to record financial transactions. A step-by-step explanation of blockchain concepts can be found in Drescher (2017) while Antonopoulos (2017) provides a more detailed explanation of Bitcoin protocol, blockchain fundamentals, cryptographic principles.

When it comes to a simple description of blockchain technology, the best we have found is one where one pictures a spreadsheet that is duplicated many times across a network of computers. Then imagine that this network is designed to regularly update this spreadsheet. Imagine also that the information contained in the blockchain exists as a shared and continuously reconciled database. This description illustrates an important feature of the blockchain, and it is that no centralized version of the information exists for a hacker group to corrupt. The information is hosted by millions of computers simultaneously; its data is accessible on the internet. Within the network, the different sets of data, i.e., the blocks, are linked to each other in a secure way using cryptographic principles, i.e., the chain. An important feature of blockchain technology is that in theory it allows digital information to be distributed but not copied. The block is It is a simple yet ingenious way of passing information from A to B in a fully automated safe manner, continuously verified by thousands, millions of computers distributed around the net. The verified block is added to a chain, which is stored across the net, creating not just a unique record, but a unique record with a unique history.

The blockchain simultaneously offers privacy and transparency. A person's identity is hidden via complex cryptography and represented only through their public address, PA, hence the privacy. So as one looks at a person's transaction history, you would not see their names, instead you would see their public address, hence the transparency about the transactions. A blockchain based tax system would have a much-needed level of accountability and transparency to most countries tax system. Then there is the so-called immutability, in the context of the blockchain it means that once something has been entered the blockchain it is almost impossible to be tempered with. The reason the blockchain gets this property is due to a *cryptographic hash function*. The implication is that falsifying a single record would mean falsifying the entire chain in millions of instances. That makes it virtually impossible to hack or to falsify and it is one of the characteristics that makes the blockchain so amazing. The blockchain offers multiple applications in the area of taxation. Imagine how many embezzlements, tax fraud cases could be nipped in the bud if people know that they cannot "work the books," cheat and or bribe their way into a lower tax bill?

2.1. A National Identification or Public Address?

An obvious question we have not addressed is what will make the consumers, producers, and taxpayers use the blockchain. What will induce them to create blocks to be used by the taxing authorities, to ensure that the government is collecting what is owed under the law. The government can and should compel individuals' as well as business and other entities to participate in the blockchain. What form will such an ID or PA take remain to be seen. But we have an idea as to what the likely path countries will follow.

Among the world democracies, India is at the vanguard of national ID movement. Established in 2009, the *Indian* Government issued a Unique Identification Authority of *India* (UIDAI) to all residents of *India*. At the time it was the most advance and the biggest biometric *ID* program in the world, by virtue of *India large population*. The first step the government should undertake is to assign individual and other entities a public address, PA, which will be used to record financial transactions associated with the taxpayer's social security, personal, and or corporate tax ID. While the various pieces of information regarding taxes and income may be made public thorough the PA, the identity of the taxpayers would not be. *In the US, such a program would face major political and legal hurdles*. The ways in which such a system is implemented vary among countries, these variations give rise to the "cone of confidence." In most countries, their citizens are issued an identification number upon reaching legal age, or when they are born. Non-citizens may be issued such numbers when they enter the country, or when granted a temporary or permanent residence permit. Many countries issued such numbers for a singular purpose, but over time, they become a *de facto* national identification number. For example, the United Sates developed its Social Security Number (SSN) system as a means of organizing disbursing of Social Security benefits. However, due to function creep, the number has become used for

other purposes to the point where it is almost essential to have one to, among other things, open a bank account, obtain a credit card, or drive a car.

We envision a system where a taxpayer will have a TIN or taxpayer identification number and a blockchain PA or public address number. This way the system introduces several layers of privacy protection. To link the PA to an individual requires linking the PA to the TIN and then the TIN to the individual business of physical person associated with the TIN. In theory such a system would increase the safeguarding of the information and privacy and anonymity of the individuals and businesses. In fact, one can argue that jurisdictions with strong privacy laws like the US and EU would strengthen the privacy and anonymity features of the system. Needless to say, no system is fool proof and there is no guarantee that the government or some of official may misuse the data. But the layers already mentioned, the interaction with jurisdictions with strong privacy laws and the design and enforcement of local privacy laws should help and more than likely result in a system better than the current one as far as safeguarding of privacy and misuse of the blockchain data.

2.2. Cryptocurrencies, Digital Wallets, and Security

In many ways the blockchain is a beneficiary of the development of the Graphical User Interphase (GUI) a form of interface that allows users to interact with electronic devices through graphical icons and visual indicators such as secondary notation, instead of text-based user interfaces, typed command labels or text navigation. [Narayanan et al. \(2016\)](#) provide a description of the Cryptography, Bitcoin and consensus mechanisms utilized. The GUI facilitated the development of digital *wallet* applications that allow users to buy things, store and manage their cryptocurrencies holdings. The digital wallet is an example of how technological innovations that have spurred the digital revolution.

Creating an e-wallet is free, and the account setup process is done online. Once the wallet is created, the user is provided with a Wallet ID, which is a unique identifier similar to a bank account number. Wallet holders can access their e-wallet by logging into the blockchain website, or by downloading and accessing a mobile application. The Blockchain Wallet interface shows the current wallet balance for cryptocurrency tokens and displays the user's most recent transactions.

Transactions online are intricately connected to the process of identity verification. Users can send a request to another party for a specific amount of cryptocurrency and the system generates a unique address that can be sent to a third party or converted into a QR code. The send/receive process is like sending or receiving funds through PayPal but uses cryptocurrency instead. The current state of the cryptocurrency world is that the apps are not much different from those used by the traditional banking system.

Cryptocurrencies can be used as a unit of accounts, medium of exchange and a store of value. Simply put, cryptocurrencies are a substitute for traditional money, the digital wallet that mimics many of the functions performed by the traditional

fiat currency financial structure. More importantly the blockchain offers the potential of cutting the middleman in many financial transactions, in principle it could also do the same for the tax code thereby reducing collection costs.

It is easy to imagine that wallet apps will evolve in the coming years to include other types of identity management, such as a taxpayer system. Wallet security is an important consideration for users as it is as well for traditional financial transactions. Having one's account illegally accessed may result in the user losing the funds in the account. Usually, cryptocurrencies employ three levels of security like the ones encountered in an online bank account:

Level 1 Security is designed to prevent users from losing account access. It allows users to verify their email address, create a 12-word backup recovery phrase that can be used if a password is forgotten, and set up a password hint (the side does not store the password). The one difference with a bank account being that if you forget the password, you lose the cryptocurrencies.

Level 2 Security is designed to prevent others from gaining unauthorized access to the wallet. It uses a two-step authorization.

Level 3 Security allows users to block Tor requests.

2.3. Cryptocurrencies and the Underground Economy

Blockchain technology makes cryptocurrencies an ideal vehicle for those involved in illegal activities as well as those involved in the underground economy in order to avoid paying taxes. However, there is a significant difference between these two groups of underground economy participants and their response to tax rate changes. Unless the law changes decriminalizing illegal activities, the participants in the illegal activities will always be underground no matter what the tax rate levels are. For those engaged in the informal or underground economy, the story is different. A reduction in the tax rates would reduce the benefits of being underground or the cost of being above ground.

Encryption makes it difficult to trace the identity of transaction agents who do not want to be found. If they never go above ground, it is exceedingly difficult for the taxing authorities to track their transactions. In this scenario, potentially, the cryptocurrency user can avoid being detected by the authorities and thus evade all taxes and the law. All of this suggests that the tax rates impact people's choice of being above, below ground and how much of their activities they will conduct in either. To the extent that cryptocurrencies lower the costs of underground activities, i.e., lower the costs of being detected, the easier it will be to go underground. Therefore, the larger will be the negative effect of a tax rate increase on an economy's tax base and revenues collection. Conversely, the ease of substitution into the underground economy will limit the taxing power and the revenue maximizing tax rate. As a result, they will engage in less underground activities.

3. The Blockchain and the Tax Code

The previous sections highlighted some of the components needed to add a block-

chain technology to a nation tax system. We argued that it is extremely important that the government ensures the privacy of the taxpayers. In order to do so, the government or taxing authority must safeguard the personal and or corporate information associated with the public address, PA. Some of the benefits of the blockchain include privacy, security, and the verification of all transactions, which reduces the likelihood of false records while increasing the system transparency.

3.1. Infrastructure Costs

Unlike credit cards and other financial transactions, the distributed ledger carries no transaction costs. But like credit cards and banks and other financial transaction mechanisms, it has an infrastructure cost. The taxing authorities must absorb the infrastructure costs as part of the tax collection activities, as a result the case in favor of a blockchain approach to taxation is ambiguous. A cost benefit analysis is needed to determine whether a blockchain system should be adopted. The infrastructure costs should be weighed against the increased transparency, reduction of tax evasion, tax avoidance as well as the prevention of corrupt and illegal activities.

3.2. Transparency and the Flat Tax

An important feature of the blockchain network is that the information is in a shared and “immutable” ledger and is open for anyone to see. Anything that is built on the blockchain is by its very nature transparent and everyone involved has access to the transaction’s information associated with the various Public ID published by the tax authorities. Consider the case of three different taxpayers with incomes of \$20,000, \$40,000, and \$60,000 respectively, see **Table 1**. For ease of calculation let us assume a 10% flat tax rate. As reliquiae of a progressive tax code, we consider three different tax brackets. The lower bracket spans from zero to \$20,000 of taxable income. The second went from \$20,001 to \$40,000 and the third for any income in excess of \$40,000. The flat tax collects \$2,000 from the lower income taxpayer, \$4,000 from the middle income and \$6,000 from the higher income taxpayer. The total tax collections add up to \$12,000, see **Table 1**, column 2. The third column also shows the amount of revenue collected by bracket. There are three taxpayers, all of which earn \$20,000 or better, hence the

Table 1. 10% falt tax scenario.

	Taxable	Collection by	Collection	Average
Taxpayer	Income	Taxpayer	By Bracket	Tax Rate
1	\$20,000	\$2,000	\$6,000	10%
2	\$40,000	\$4,000	\$4,000	10%
3	\$60,000	\$6,000	\$2,000	10%
All	\$120,000	\$12,000	\$12,000	10%

first bracket overall taxable base adds up to \$60,000 of taxable income, at a 10% tax rate the tax collection in the bracket amount to \$6,000. In contrast there is only one taxpayer in the highest bracket of which only the last \$20,000 falls in the highest bracket. Hence the 10% flat tax only collects \$2,000 as the highest bracket. The last column reports the average tax paid by the taxpayer. True to form a 10% flat tax generates a 10% average tax rate for each taxpayer, irrespective of its tax bracket.

Next, we focus on how the public availability of the tax payment information reinforces the government efforts to root out evasion and evasion of taxpayers legally owe the government. The taxing authorities could disclose the information in a way that the taxpayers PA remains anonymous. It can do so by assigning public numbers or taxpayers public ID to the PA while maintaining the privacy of the links. That is, only the taxing authorities would have access to the links between the PA and the published public ID numbers associated with the different accounts.

Once the privacy of the PA is assured, the government can benefit from the collective wisdom and information provided by all taxpayers. The blockchain network allows everyone—the government, newspapers reporters and any private citizen—to search for the data, analyze it and flag anomalies. For example, one may check whether the income reported by a public ID matches the transactions reported by that Public ID. The data would be available for all to see. Discrepancies may trigger additional research on the part of the tax authorities and other investigative entities whose PA is associated with public ID. A discrepancy would be the first step to identifying either incomplete information and or tax evasion.

The added transparency and global data collection will reduce tax evasion while simultaneously increasing the integrity of the income and tax revenue statistics. Here is how: If we are willing to assume a simple tax code, say a flat tax on income and a valued added tax in lieu of the corporate tax, with both taxes applied at the same tax rate, the revenues owed by individuals and businesses are easily calculated from the publicly available information on the distributed ledger. The taxes paid should be proportional to the income tax base and equal to the flat tax rate, i.e., 10% in this example. Again, with all this information, the identification of the public IDs that pay a different tax rate is an easy search. The divergence of the average tax rate paid from that of the legislated tax rate would be the first step in a potential audit of the taxpayer with the PA associated with the public ID identified with a divergent effective tax rate. The auditor would search for the reason some PAs are paying a lower effective tax rate. Tax avoidance is the null hypothesis that must be disproved. Similarly, those who pay a higher tax rate would lead the auditors to consider the possibility that a person or business associated with the PAs in question is understating its income. Another null hypothesis for the taxpayer to disprove. The fact that such information could be easily calculated and readily available may deter the tax filers from attempting to underpay their taxes or understate their income. If the tax assessors do not pursue an audit or explana-

tion for these anomalies, the tax revenue vigilantes and anticorruption organizations could publish the discrepancies, sort of a hall of shame for tax avoiders. Such a system may also discourage corruption and root out incompetence on the part of tax assessors. The blockchain-flat-tax combination fosters transparency and induces better enforcement on the part of the tax collectors and assessors. This is not theory, we know of instances in the countries such as the Dominican Republic, DR, where presumed drug dealers ran legal businesses and consistently underpaid or never paid their businesses tax liabilities, and yet the authorities either as a result of ineptitude or corruption allowed the businesses to continue operating. If the reason for the continued tax delinquency is due to corruption, the full extent of the law should be applied to all involved. If delinquency is deemed to be incompetent, the auditors should be fired for cause. Looking back at the DR news, the information about the taxes in arrears did not become known until the DEA got involved and searched for the presumed drug dealer to apprehend him. Had a blockchain system been in place, the tax and sales information on that public ID would have been readily available on the net. We are sure that some financial reporter would have brought the information to light. Public opinion would have brought a great deal to the DR authorities. A simple tax code like the one we have described combined with a blockchain would reduce corruption and tax avoidance resulting in an increase in the tax revenue yield, a larger tax base and additional tax revenues.

4. Economic Efficiency and the Flat Tax

The idea of taxing all income at a single rate can be traced to 19th-century economists like John Stuart Mill, who advocated simplicity in taxation. Then there is the economic efficiency argument that to raise a requisite amount of revenue, a flat tax on all income results in the lowest average and marginal tax rate. Since the flat tax minimizes the difference between the before and after-tax income, it also minimizes the disincentives to work, save, invest and produce. The quest for policymakers is how to blend the features with the flat tax and simultaneously satisfy the social safety net objectives while also minimizing the distortive effects of such programs. These objectives fueled in part by the Reagan tax reductions led to moderate iterations of the flat tax with distinct social safety net components or features. With these objectives in mind, Economists Robert Hall and Alvin Rabushka of the Hoover Institution formalized the modern flat tax in their book “*The Flat Tax*” (1985). Canto and Laffer (1992) developed their version of a flat tax for California. Jerry Brown during his 1992 presidential campaign adopted the Canto-Laffer version and proposed a national flat tax. His plan was radical for a Democratic candidate, emphasizing simplicity and appealing to anti-establishment sentiments. Then in 1996, Steve Forbes a Republican businessman, championed a version of the Hall and Rabushka tax plan and proposed 17% flat tax. Ventura (1999) explored the economic impacts of flat tax reforms using computational

models.³

The argument for a flatter and less progressive tax was one of Milton Friedman advocacy. He frequently highlighted Hong Kong as a prime example of economic success driven by free-market policies that resulted in a flatter income tax. See [Friedman and Friedman \(1980\)](#), [Friedman \(1981, 1993 and 1997\)](#). He emphasized how Hong Kong combination of economic freedom and legal predictability fueled its rapid economic development. During those years Hong Kong imposed a top 15% tax rate on income and 16.5% on corporate tax rate and zero capital gains tax rates. A charitable interpretation of these tax structures could consider them sympathetic with the Flat Tax. Therefore, one can argue that Friedman was making the case for a Flat Tax. The success of Hong Kong economic policies led the Heritage Foundation *Index of Economic Freedom* (2024) to designate Hong Kong as the freest economy for several years in a row. Friedman was also quite prescient when shortly before Hong Kong SAR's return to China when he warned against potential interference under new governments.

4.1. Progressive Taxation versus Flat Tax Rates

The Hong Kong experience is in part a testament to the success of the low flatter tax rate adopted by the Hong Kong Authorities. Our argument for supporting a flat tax system is based on the transparency, ease of implementation and economic efficiency that the system offers. However, these are not the only considerations that a government must consider. Economic inequality has surfaced and is at the forefront of many political debates. We surmise this is a direct result of the slow economic growth the global economy has experienced during the last decade. The slow growth eliminated one way by which people increased their slice of the economic pie. And when the pie does not grow, the only way to get a bigger slice is to get it from other people through redistribution. As the rate of GDP growth slows, income redistribution and inequality come to the forefront. This process ends when the economic pie shrinks enough that even income redistribution fails to yield an increased share for the redistributors. At this point, the redistribution policies are abandoned and, in some cases reversed as pro-growth policies, i.e., deregulation and tax cuts are adopted.

4.2. Exemptions and Flat Tax

The no deduction feature of flat tax, while simplifying and minimizing the distortive effect of tax rates, it precludes the implementation of some social safety net provision that society may consider desirable. The Hall-Rabushka and Forbes plan deal with this issue by exempting a portion of the income subject to tax. Let us use the Forbes flat tax proposal to illustrate our point. Mr. Forbes proposes a 17% flat

³The surge of the Flat Tax literature coincided with the fall of the Soviet Union, some of the eastern European countries, like Estonia and Slovakia, adopted many of the free-market precepts and implemented flat tax systems in the 1990's and early 2000's. [Mitchell \(2003\)](#) chronicles global adoption and impact of flat tax systems while [Keen and Konrad \(2013\)](#) discuss tax structures, including flat tax systems, in a global context.

tax on personal income and corporate profits. These two taxes would replace the current personal and corporate income tax structure. The corporate tax also features immediate expense of any capital investment while the personal income tax component would eliminate the capital gain tax, estate taxes, as well as taxes on dividends and interest. The proposal would also eliminate most of the tax deductions including charitable contributions, state and local taxes as well as the mortgage interest deduction. These would be replaced by an individual \$13,000 exemption adding to \$26,000 per married couple plus a \$5,000 per dependent. Hence a married couple with no children would have its first \$26,000 worth of income exempt, i.e. taxes at zero rate, while the rest of their income would be taxed at a 17% rate. Just think of what happens to the married couple whose income rises from \$25,999 to \$26,001. Their marginal tax rate increases to 17% from 0%. While these flat tax proposals unambiguously reduce the progressivity of the tax system, simplify it, and increase incentives to work, save invest and produce. However, their provision exempting a portion of the income subject to tax do not completely remove the progressivity.

4.3. Progressive Taxation?

Critics often argue that flat taxes reduce progressivity, benefiting higher-income earners while shifting the tax burden downward. While there may be some truth to that criticism, one can argue that this is a direct result of the progressive taxation. A simple numerical example will suffice. Consider a progressive tax code where the top marginal tax rate is 90% and the lowest tax rate is 10%. Now consider the keep rate for each of these two brackets. A person in the top bracket keeps ten cents of each additional dollar earned while a person in the lowest tax bracket keeps ninety cents of each additional dollar earned. Next let us consider the impact of a 10% across the board tax rate cut on the keep rate of each taxpayer. The person on the top bracket will now face an 83% tax rate and keep seventeen cents of each additional dollar earned. Hence the top bracket taxpayer experiences a 70% increase in after tax returns. In contrast the person in the lower tax bracket will now experience a 9% tax rate and will get to keep ninety-one cents of each additional dollar instead of the ninety cents kept before the rate cut. That is an 11% increase in incentives or after-tax returns. These numbers show that those who pay the most at the margin benefit the most. That is the result of the across-the-board tax rate cuts in a progressive tax code. However, the criticism that the tax rate cuts benefit the higher income people ignores the incidence taxation. Which factor pays for or benefits from the taxes depends on whether the taxes can be shifted forwards or backwards and that depends on the demand and supply elasticities of the factors of production. While it is true that the flat tax proposals reduce progressivity, it is not necessarily true that it benefits the higher earners.

We believe that a progressive tax system unnecessarily results in too high a marginal tax rate for the economy in relation to the revenues raised. In doing so, it maximizes the disincentives to work, save and invest while maximizing the incen-

tives to evade and avoid taxes, which significantly reduces the tax base and encourages corruption and the underground economy. Also, a traditional progressive income taxation with its exemption combined with an industrial policy doling incentives to favored groups introduces a great deal of some opaqueness to the blockchain available data thereby making the job of the tax vigilantes much more difficult. The reason is simple, when disparities in average taxation for a particular level of income arise, the tax vigilantes will not be able to determine whether the differences in average tax rates are a result of the government policy, evasion, avoidance, corruption and or government favoritism. Finally, the politics of special interest groups tells us that these allocations are quite often abused, leading to political clientelism, patronage and outright corruption.

Despite our reservations and counter arguments, progressive taxation has a strong constituency and is more than likely is here to stay. That in turn raises the issue of whether blockchain technology can accommodate the income redistribution embodied in a social safety and an industrial policy while simultaneously delivering a more efficient progressive tax structure that preserves the transparency of the flat tax? The answer is in the affirmative. Our only comment is that it will take a bit of programming, but it is doable. Before we establish this, we need to specify a simple progressive tax structure that on a static basis raises the same amount of revenue as the flat tax in order to use it as a reference point in our analysis.

4.4. A Revenue Neutral Progressive Tax

A simple numerical example yields some obvious and yet interesting insights regarding the implementation of a progressive tax that on a static basis, collects the same amount as the flat tax. Consider a hypothetical tax code that where:

The first \$20,000 income is taxed at a 6% rate,

The next \$20,000 at a 12% rate,

And the next \$20,000 at an 18% rate.

Such a tax system exhibits a progressive structure. The middle-income taxpayer faces a marginal tax rate that is twice that faced by the lower income taxpayer while the top bracket taxpayer faces a marginal tax rate that is three times that of the lower income taxpayer. Taxpayers earning \$20,000, \$40,000, and \$60,000 will have a tax liability of \$1200, \$3600, and \$7200, respectively. A progressive tax liability where the average tax rate rises with income to 6%, 9% and 12%, respectively. In contrast the flat tax collects a constant 10% from each and every taxpayer, see **Table 1** and **Table 2**. A feature of the progressive tax code is that all three taxpayers, irrespective of their income levels, pay \$1200 on the first \$20,000, while two of the taxpayers pay \$2400 on their second \$20,000 irrespective of their income level. The individual tax liability on the incremental \$20,000, i.e., increases as the income level rises. That is the nature of a progressive tax code. Notice that the total revenue collection of the progressive tax is the same as that of the flat tax reported in **Table 1**. Hence the tax reform switching from the progressive tax to the flat tax or vice versa is revenue neutral on a static basis.

A comparison of **Table 1** and **Table 2** yields some interesting results: First the progressive tax code reduces the tax liability of the lower income taxpayer while increasing the liability of the upper income taxpayer suggesting that the progressive tax did meet its objective.

Table 2. Progressive tax, the revenue neutral scenario.

Taxpayer	Tax Brackets	Tax Rates	Collection		Average
			By Taxpayer	By Bracket	Tax Rate
1	\$0 to \$20,000	6%	\$1,200	\$3,600	6%
2	\$20,001 to \$40,000	12%	\$3,600	\$4,800	9%
3	\$40,001 to	18%	\$7,200	\$3,600	12%
			\$12,000	\$12,000	10%

However, one question that we did not ask and remains unanswered is whether the progressive tax is the best and most efficient way to collect tax revenues and meet its redistribution or social objectives? Again, a comparison of **Table 1** and **Table 2** as the differences between the two reported in **Table 3** provides us with an answer.

Table 3. Comparing the flat and progressive taxes.

Taxpayer	Tax Brackets	Change in Incentive	By Taxpayer	By Bracket
1	\$0 to \$20,000	4.4%	(\$800)	(\$2,400)
2	\$20,001 to \$40,000	-2.2%	(\$400)	\$800
3	\$40,001 to	-8.9%	\$1,200	\$1,600

The reduction in the tax rate on the lower bracket to 6% reduces the tax payment of the lower income taxpayer by \$800. That is the taxpayer liability under the progressive tax is now \$1200 and it was \$2000 under the flat tax alternative. However, the last column of **Table 3** shows that the progressive tax also reduced the tax take on the first \$2000 of all taxpayers, resulting in revenue loss or revenue reduction of \$2400 or three times the reduction to the lower bracket taxpayer. That is an expensive way to achieve a reduction in taxes as part of a social safety net program. The costs lead one to wonder whether it is possible to find a cheaper or less expensive way to deliver the \$800 tax benefit to the lower bracket. Then, there is the impact of the progressive tax on the incentive structure. Notice that the take home take of the people in the highest bracket declines by 8.9%. Simply put, the increase in tax rates reduces the incentives to work, save and invest by at least 8.9%. The negative impact on the economy will be large the larger the substitution effects. Again, a result that raises the question as to whether it is possible to reduce these disincentive effects while meeting the social safety net, income redistribution objectives.

4.5. An Alternative to Progressive Taxation

A modified flat tax, one that combines a flat tax with a transfer program, can be tailored to deliver the same after-tax income with a much lower distortion level, i.e., a lower marginal tax rate than the progressive tax already discussed in **Table 2**. In this numerical example, a 12% flat tax would do the trick. Here is how the modified tax would work: A person making \$20,000, at a 12% tax rate, faces a tax liability of \$2,400. Then if that person received a transfer payment worth \$1,200, his or her tax liability net of the transfer payment would be \$1,200. The same amount paid under the progressive tax code, see **Table 4**. In turn if a person earning \$40,000 has a tax liability of \$4,800, if that taxpayer received a transfer payment of \$1,200, his or her net transfer tax liability would be \$3,600. Finally, if the person earning \$60,000 received no transfer, their tax liability would be \$7,200. This simple example illustrates how a modified flat tax combined with an transfer program could generate the exact same amount of net tax revenues as the progressive tax outline in the previous section. Just compare the average tax rate of the two tax programs, see the last column of **Table 2** and **Table 4**.

Table 4. Tax revenues by taxpayer.

Taxpayer	Tax Brackets	Progressive Taxes	Flat	Transfer	Net Tax	Average Net
1	\$0 to \$20,000	\$1,200	\$2,400	\$1,200	\$1,200	6%
2	\$20,001 to \$40,000	\$3,600	\$4,800	\$1,200	\$3,600	9%
3	\$40,001 to	\$7,200	\$7,200		\$7,200	12%
			\$14,400	\$2,400	\$12,000	10%

The previous paragraph shows that in terms of the net of transfer payments, the revenue collected and the average tax burden of the taxpayers in each of the tax brackets is the same for the progressive tax and the modified flat tax, are the same. Hence both taxes satisfy the government social safety net and overall expenditure needs.

But there are key differences that make the modified flat tax the superior alternative. Notice that the progressive tax collects \$12,000 and has a top marginal tax rate of 18% while the modified flat tax with a tax rate of 12% collects \$14,400. That is the modified flat tax collects more revenues with a lower top marginal tax rate. How is this possible?

The progressive tax focuses on taxing the lower income people at a lower average tax rate. In this case 6% of those earn \$20,000. To this end the progressive tax applies to a 6% tax rate to the first \$20,000 of income earned by a taxpayer. This means a tax of \$1,200. Thus, for the people earning \$40,000 who face an average tax burden of 9%, the 6% tax rate on the first \$20,000, that is a 3% deficit in relation to the 9% average tax rate. The 3% shortfall represents a shortfall in the tax revenues generated by the first \$20,000 of the taxpayers in the second bracket, i.e.,

earning \$40,000. A revenue loss that is avoided when a flat tax is applied to all income and transfers are used to reduce or adjust the tax burden by income classes. Doing it this way does not alter the economy marginal tax rate and avoids providing the “transfer” to the higher income people and thus resulting in a higher tax revenue collection, \$14,400 in this example. Simply put, we have structured the transfer program for the higher income people do not get a lower tax rate on their first bracket of income. This minimizes the revenue losses of a progressive tax code. Attempt to correct the redistribution to higher income people by phasing out of the exemptions as the income levels rise. The phase out reduces the income transfer while increasing the effective marginal tax rate. Inducing a substitution effect away from market activities which reduces the tax base.

In order to implement the program, the government now needs to collect additional \$2,400 which is returned to the private sector, to the lower income people in the form of transfer payment. This combination of flat tax and transfer program produces the same distribution of after-tax income on a static basis as the progressive tax while in the process reducing the marginal tax rate faced by the economy. Instead of an 18% top marginal rate, our program results in a 12% top marginal rate. That is our proposal to increase the keep rate to 88% from 82% of every additional dollar earned. A 7.3% increase in incentives to work and produce.

A point to make when comparing the two flat taxes, the one without income redistribution, **Table 2**, and the one with the transfer payments, **Table 4** is that the calculations show that the redistribution scheme results in an increase in needed tax revenues of 20% and a higher marginal tax rate of 12% instead of 10%. Income redistribution is not free lunch. However, to the extent that the policy-makers consider income redistribution a desirable activity, the alternative that we propose, the flat tax transfer program combination, is less expensive and much more efficient than the progressive tax alternative. In general, a progressive tax structure introduces a great deal of opaqueness to the system while the modified flat tax structure outlined here maintains the transparency of the flat tax. Again, to the extent that the modified flat tax increases the take home, it increases economic incentives and that promotes faster economic growth and transparency. As the economic pie increases, the political pressure in favor of income redistribution wanes. What poor people need is growth and opportunities, not a government handout.

4.6. The Distributed Ledger and the Social Safety Net

The distribution of social safety net benefits is a simple problem to solve. In the US, the government already has the infrastructure in place, the Supplemental Nutrition Assistance Program, SNAP. Other governments have similar social safety net programs. We propose a slight modification or enhancements to these social safety net programs, to create an electronic wallet for each taxpayer or physical person in the country, and those who qualify for the aid would get the funds deposited into their electronic wallet.

A common criticism of some social programs is that many of the recipients do not have bank accounts and as a result certain type of transfers-transactions become difficult. Our answer is simple, cell phones are almost universal. The government has programs to help the needy by providing them with cell phones and they provide a solution. The transfer could be arranged by some Fintech companies. Kenya's experience with *M-Pesa* immediately comes to mind.⁴

M-Pesa revolutionized financial services in Africa by enabling users to perform banking transactions through their mobile phones without needing a traditional bank account. For those who do not know the company, it is a virtual banking system that provides transaction services through a SIM card. Once the SIM has been inserted into the card slot of the mobile device, users can make payments and transfer money to vendors and family members using SMS messages. Problem solved. There is no reason a similar system should not be extended to corporations.

Rather than give tax breaks or enact regulations that favor particular activities or industries, we prefer a direct transfer along the lines we have outlined. The one advantage of this system is that it measures exactly the transfer of resources to each public identity. This way the people would know how much is being spent on the activities.

Now let us get back to why we believe the system will evolve this way. The main reason is economic efficiency. Only the people targeted for the transfer receive the transfer, there are no unintended recipients as there are with the traditional exemptions in the tax code. This means that the tax rates needed to get the resources to the target audience will be lower than the revenue needed under the traditional progressive tax code. A lower tax rate means a lower distortion and smaller adverse substitution effects that reduce GDP, the tax base. Finally, under the tax system outlined, there is no loss of transparency when compared to the flat tax and none of the opaqueness of a progressive tax code, with the government doling out or favoring specific sectors of society. The political corruption and favoritism vigilantes will push the public opinion in this direction.

5. Network Effects, the Underground Economy, and Other Factors

Next, we focus on two distinct groups of the underground economy. We classify their activities into what one may call informal economy and the underworld activities. The latter group engages in illicit or traditional criminal activities like drug dealing, human trafficking. For that group nothing short of legalization will make them surface above ground. But the underground economy is much more than that. It also includes a second group which we depict as the informal economy, where tax avoidance of income and profit generated in legal activities is the order of the day. The fuel for the informal economy is partly attributable to the dis-

⁴M-Pesa is a mobile money transfer and payment system launched in 2007 by Vodafone and Safaricom in Kenya, see Jack, & Suri (2011, 2016), Demombynes and Thegeya (2012) and Mbiti and Weil (2011).

torting effects of the tax rates, the regulatory burden on the formal economy and even illegal immigration, all of which induce a substitution effect away from taxable activities.

Many of the features associated with our proposal derived from the cryptocurrency's technology and infrastructure such as the electronic wallet facilitate the underground activities of both groups. That in turn makes it easier to avoid and evade the taxes, which raises the question of whether taxes can be avoided permanently?

A permanent tax avoidance requires that the underground generated income to never resurface above ground. If it does, the underground income earner risks being detected. As long as above ground income and spending information is available, anyone in the blockchain will be identified. The same holds for any difference between spending and reported income. The only way to ensure never being ensnared by the tax authorities is to remain underground forever. However, at some point in time, people in the underground economy must surface above ground, be it through buying a home, a vehicle, or any other expense. If they pay cash for their activities the likelihood of being detected declines. But then, if the recipient is an above ground actor, he or she will be responsible for the taxes associated with that income. Alternatively, some underground actors may resort to money laundering. But eventually someone has to recognize that income and pay taxes on it. One solution is to charge transactions without the associated PA, the combined value added and the flat tax rates. This way at least some of the underground activities will be taxed.

If the tax code is a flat tax as we have described, it does not matter who pays the taxes, the amount will be the same. Under the tax code that we have described, any above ground activity will be taxed. More importantly, the transparency of the flat tax facilitates the crossing of information across taxpayers and transactions and such a system will generate a network effect like that of social networks. Then there is the parallel with the social networks is one where each PA is a "friend." Once you friend someone, the list of people's friends also becomes visible to you and you to the rest of your friends. You may add them to your network and they you. The interconnection increases the network effect. The same happens with the blockchain transactions. The collective blockchain information set grows exponentially as the number of participants increases and that increases the likelihood of detection of the underground activities.

6. Implementation Pitfalls

The impact of the digital revolution on the tax structure will not be uniform. The implementation costs will vary across countries depending on their stage of development, the degree of transparency and collection efficiency etc. For some countries it may be cheaper and more efficient to leapfrog the existing infrastructure and move to a more "advanced" technology. The analogy we have in mind is the telephone system. Many emerging economies effectively leapfrogged the land

lines and moved directly to mobile devices, i.e., cell phones.

The digital innovations already mentioned are making great progress in several economies around the world with varying degrees of success. One example is M-Pesa's impact on banking services in Africa. Yet, even for such a successful company, not everything has gone according to plan. While M-Pesa success in Kenya is undeniable, it ran into some difficulties and had to withdraw from South Africa. M-Pesa's experience suggests that initial conditions do matter and must be taken into consideration in order to design a successful implementation.

Another example of a successful, too successful, roll-out of a payment system is China. [Chen and Loo \(2021\)](#) Discuss the adoption and cultural impact of digital payments like WeChat Pay and Alipay in China. While [Sun and Wang \(2020\)](#) provide a comprehensive overview of mobile payments' impact on the Chinese economy. APPs like WeChat Pay and Alipay are a remarkable success, in fact so successful that many merchants no longer take cash. And this posed a problem for tourists in China. There are stories of tourists who were unable to purchase items because merchants no longer took cash and their payment methods, i.e., Visa and Mastercard, were not accepted. The only payment mechanism accepted by the merchants were Chinese payment systems such as WeChat Pay and Alipay, among others. The obstacle here was the result of the regulatory burden and controls imposed by the Chinese authorities. These measures limit the quasi-market economy. As part of the command-and-control policies, the Chinese authorities imposed severe restrictions on the opening of these accounts by foreign nationals. An example where technology and convenience are butting with the Chinese *dirigisme* and their attempt to control every aspect of life within China's borders. It will be interesting to see how the Chinese authorities accommodate the foreigners need while simultaneously attempting to maintain their control of the Chinese people and the economy. Keep an eye on Hong Kong.

India is another example of a country where the digital revolution has made great inroads and where some of the government policies aimed at deepening the digital revolution have backfired. In 2016 the Modi administration, in an unexpected move, overnight banned cash notes valued at almost 90% of the currency in circulation.⁵

The motivation behind the policy was to curtail tax evasion and official corruption. Something that we believe that our modified flat tax proposal would deal more efficiently. The rationale behind the cash ban was that the masses would be forced to transact cashless on the government provided cell phones and bank accounts the government provided to all Indians. Sadly, the government plan assumed a seamless transition to a cashless economy. Simultaneously, another Indian policy was also introduced, a nationwide goods and service tax replacing a patchwork of local taxes. The simplification was intended to introduce transparency and reduce the regulatory burden of having to deal with a myriad of taxes

⁵Ghosh, J., and Chandrasekhar, C. P. (2017) provide a critical evaluation of the policy and its economic impact, while Suri (2018) discusses the digital payments push following demonetization.

and regulations across localities, a good thing. The policy was in part aimed at speeding India's incorporation of the informal economy into the formal economy. However, one provision of the program has had an unintended effect. The value added tax required all but the smallest businesses to sign up online, submit electronic filings and pay taxes on a common platform. Sadly, the measure imposed too big a burden on small businesses in the informal economy. Replacing the currency notes and forcing the filing requirements on the small businesses disrupted the informal economy while doing little to stimulate the formal economy. The net effect of these policies was a recession in the underground economy that made the neediest worse off.

The experiences of Africa, India and China point to potential pitfalls associated with the implementation of recent technologies. These examples also point to the huge benefits associated with a reasonable and successful implementation of digital technology.

7. The Low Hanging Fruit

A blockchain could improve the effectiveness and applicability of several tax and financial laws while simultaneously reducing their enforcement costs. These applications would be part of what we call the blockchain technology low hanging fruit. The list includes Anti-Money Laundering, AML, and Know Your Customer, KYC, practices.

Financial institutions must perform labor intensive multi-step processes for each new customer in order to satisfy both the AML and KYC laws and regulations. A blockchain based system could simultaneously increase monitoring activities and effectiveness. An example would be to allow customers to take snapshots of key documents such as passports, driver's license etc. Once verified by the institution, the data could be cryptographically stored in the blockchain and be accessible by all participating financial institutions as well as government agencies tasked with tax evasion and money laundering.

As publicly accessible ledgers, blockchains can make all kinds of recordkeeping more efficient and that brings us to another possible low hanging fruit: Property titles. A topic dear to Hernando de Soto (1986, 2000). His work emphasizes that the lack of formal property rights is a critical barrier to economic growth, especially in developing countries. De Soto argues that formal property rights are essential for economic prosperity. Property rights allow individuals to secure their assets, access credit, and participate in the formal economy. A distributed ledger could easily accommodate the history of ownership, improvements to the property and whether there are any liens on the property, loans etc. Since the records are immutable once the information is entered, it would reduce the likelihood of fraudulent titles. The registry would also make it easier to search for the characteristics and liens on a property thereby enhancing the property rights. The authorities would also benefit greatly. It would help the tax authorities search for the tax avoiders and underground actors by linking their income and financial infor-

mation. Any inconsistency could trigger an investigation, be it for money laundering, or tax evasion. For the revenue collection agencies, the blockchain would also make it easier to administer and monitor property taxes and asset valuation. Think of a Zillow like system where the authorities can update the valuation of the different properties instantaneously and continuously. It will also track and record who is paying the taxes. All of this should improve revenue collections significantly.

8. The Long Run

All the components needed to implement a modified flat tax along the lines we have discussed here are already in place. Our analysis incorporates four distinct aspects of a tax structure that would play an outsized role on the influence of the digital revolution on tax policy: Transparency, privacy, income redistribution and the incentive structure. The interaction between digital innovations and these driving factors leads us to a modified flat tax as we have outlined.

1) Transparency and privacy will be a major driver behind the digital revolution's impact on tax policy. The blockchain can register and timestamp all the transactions associated with a public address, PA, and personal information. The IRS using cryptocurrency technology creates PAs while simultaneously guarding the privacy of the taxpayer's information associated with each PA. It should not be difficult for the government to create the equivalent of digital wallets in order to collect taxes, disburse transfer payments and issue refunds.

A blockchain can make the taxpayers' information readily available and accessible in an anonymous way for all to see and examine. The ease and availability of the data allows the IRS and other groups to search the data for anomalies commonly associated with tax avoidance and evasion. The greater the degree of opaqueness in the tax code the easier it will be to hide the tax evasion and avoidance activities. The more difficult it will be to identify the anomalies. Hence if transparency is an important political and economic objective, the modified flat tax is one straightforward way to accomplish this objective.

The politics of special interest groups also play a key role in our analysis.⁶

Some special interest groups tell us that some groups will be devoted to identifying and rooting out corruption and evasion. Other groups will devote resources to tilting the tax system in their favor. The former will advocate simplicity and the latter if successful will add to the opaqueness of the tax code. The net of these two effects will determine the transparency of the tax code. For honest taxpayers, tax

⁶Truman (1951) explores how interest groups emerge naturally in society and interact with political systems and Olson (1965) shows why individuals join interest groups and how these groups overcome collective action problems to influence politics. Grossman and Helpmann (1994) developed a model showing how special interest groups influence government policies, particularly trade protection, through lobbying. Lowery and Gray (2004) Examined the pluralistic and competitive dynamics of interest group influence in democratic systems while Bardach (1980) explored how special interest groups shape the implementation phase of policy-making to align with their goals. Finally, not everything is negative, Hall and Deardorff (2006) argued that lobbying serves as a resource for legislators by providing expertise and information.

collectors and tax vigilantes, their jobs will be easier the more transparent the tax code. It facilitates the identification of the cheaters while reassuring them of the fair and efficient application of the tax code. The flatter tax increases the transparency of the tax code. It facilitates the calculation of the average tax rates paid by the different public addresses, PA. In turn any unexplained disparity may be a source of investigation by the IRS or the tax advocates.

The blockchain and cryptocurrency technologies in addition to privacy and transparency also offer a strong defense against hacking. However, the defense is not absolute. With the advent of quantum computing the traditional security measures may be at risk. While one can argue that the current technology may not be able to break or decipher the so-called keys used in cryptocurrencies and or bank accounts, but the quantum computing technology will. However, this is not a problem unique to the cryptocurrencies. It will also impact financial institutions and or any other keys and password-based technologies. We believe the market will provide a solution to this problem in the future once quantum computing becomes accessible to the masses.

2) Income redistribution and the incentive structure as we have outlined are achieved through transfer payments to both individual and corporate taxpayers. The resources will be transferred to them through the electronic wallet that the taxing authorities create for the different Public Addresses or PAs associated with the different taxpayers. To the extent that the transfers are publicly available and transparent, the voters will see how the resources are allocated to the diverse groups. Through the ballot box they will be able to determine the allocation of resources to the different interest groups. Given the added transparency of the modified flat tax the voters will know exactly where the funds collected by the government are being spent.

Our analysis assumes that the government wants a tax code that raises the requisite amount of revenues in a way that minimizes the economic distortions that detract from economic activity. A focus on the incentive structure leads to a broader base and flatter tax. From a revenue raising collection point of view, the broader the tax base, the lower the distortion of the marginal tax rate associated with a given amount of revenue collected. Another argument against a higher marginal tax rate is that it increases the level of underground economic activity, and that has an increasingly negative impact on revenue collection. Once a taxpayer person goes underground it is exceedingly difficult to resurface. Under most tax codes, absent a tax amnesty a taxpayer that resurfaces and joins the formal economy will be liable for the avoided taxes, fined for the avoidance of the tax, and charged interest rates on the amount owed. The longer the larger the potential tax liability. The more expensive it will be for them to go above ground. However, the blockchain has a secret weapon that could reduce the potential cumulative evasion, it is the network effect. The greater the participation of taxpayers, the greater the crossed information and the easier it is to reconstruct or identify underground income. Also, as cumulative information and participation increases,

so will the network effect, and so will the likelihood of underground activity be discovered. The flatter and blockchain technology also increase the transparency of the tax system which in turn increases the likelihood of detection of tax avoidance and evasion techniques. All good and desirable characteristics.

Not every innovation will go in favor of the tax collectors. The easier it is to use and the more acceptance the cryptocurrencies have, the easier it will be to go underground. If the cryptocurrencies are truly untraceable, the larger is the erosion of the tax base, as the informal economy increases in size. The point of all this being that as the cryptocurrencies gain acceptance, they will have a limiting impact on the revenue raising tax rate and vice versa.

Fairness and income distribution are issues of significant importance to the electorate. Under the current structure these policies are affected through a progressive tax code aimed at collecting a lower share of income from lower income people. The progressive tax is combined with a social safety net program that doles out “mean tested” benefits. We contend that the modified flat tax along the lines that we have described is superior to the existing structure. The reason is simple. The progressive tax, as we know, taxes all income in a bracket at the same rate irrespective of the overall income level of the taxpayer. In the example of a progressive tax structure reported in **Table 2** the first \$20,000 worth of taxable income carries a tax liability of \$1,200 whether the taxpayer earns \$20,000, \$40,000 or \$60,000. This means that in order to increase the average tax take as income rises, the progressivity of the tax code has to increase by the implied shortfall due to the low tax rate of the first income bracket and then some. In contrast the flat tax combined with the transfer payment uses the latter to adjust and deliver the desired average tax burden by income. Furthermore, since the transfer only applied to those who need it, i.e., those in the appropriate bracket, it excludes the higher income people and that reduces the revenue need relative to the traditional progressive tax code depicted in **Table 2**. Furthermore, the fact that less revenues are needed means that the progressivity of the average tax burden can be accomplished with a tax rate lower than the top income tax rate of the progressive scheme. A program that achieves the redistribution objectives of the traditional progressive tax structure using a flat tax program combined with transfer payments in order to replicate the progressivity of the tax code and does so by reducing the economy marginal tax rate while expanding the tax base is a good thing. It leads to an increase in incentives to invest, work and produce.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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