Weights Computation For Optimal Average Taxation

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Prior research reported that the optimal tax rate for maximizing per capita gross domestic product (GDP) adjusted for purchasing power parity (GDPppp) is 21 percent worldwide. This is the rate that applies to the total domestic income from all production and services. However, this income emanates from a variety of sources. These component income sources might be taxed at different statutory rates. In the United States of America (USA), statutory tax rates might be graduated as incomes rise from low to high values in the interest of what is said to be social justice. The reason for these differences might also be due to desired outcomes and politics of social mores and may vary regionally by state and by city. Differences might also exist by industry for desired economic outcomes or by political priority. The purpose of this paper is to identify the various sources of income in the USA, and to determine the optimal weights that when applied to these income components result in a weighted average tax that amounts to 21 percent.

Keywords: CDR, GDPppp, capitalism, democracy, rule of law, optimal tax rate

INTRODUCTION

Economic Growth

U.S. economists and legislators are divided over whether to raise or lower taxes to balance the US budget. This paper demonstrates how to compute the weights that when applied to the various sources of income and tax brackets, results in an average tax rate of 21percent and thereby maximizes GDPppp. The first mathematical model that was the basis of optimal tax derivation is the capitalism, democracy, rule of law (CDR) model (see Ridley, 2022, 2023, Appendix A). In the CDR model capitalism (C) is defined as the degree of organization of capital. Capital is defined as *intangible exogenous potential for human imagination and creativity and the source of wealth.* Exogenous capital is converted to endogenous capital stock used in the production of goods and services. After consumption, depreciation (capital consumption allowance) and obsolescence, the remainder is contribution to wealth. Capitalism is measured by the total market capitalization. It is the value of all outstanding publicly traded stocks on the stock markets. It represents the present value of all future income from investments in the production of goods and services that constitute GDP. Democracy (D) is defined as *an intangible exogenous catalyst that creates new pathways for the optimal deployment of capital*. Rule of law (R) is defined as *the reverse of corruption, the protection of shareholder and other property rights, enforcement of contracts, and an intangible exogenous*

catalyst for stability and the attraction of capital. Whereas capital stock is used up in production and is therefore endogenous, D and R remain the same and are therefore exogenous. The measure of standard of living adjusted for purchasing power parity (GDPppp) is computed from the CDR model as a weighted average of C, D, R, and natural resources (N) and latitude (L). The model explains 90 percent of GDPppp. The model is called the CDR model because whereas C, D, and R are policy variables, N and L are natural variables that are outside the scope of government policy. The theoretical optimal tax rate derived from the CDR model is 21 percent. An empirical plot of tax revenue and GDPppp were obtained by Ridley & Davison (2022) and reproduced here in Appendix B. Empirical results do not represent the theory of the population.

If the objective is to maximize tax revenue, then the best estimate of tax rate is 32 percent. Then, balancing the budget requires spending that matches the revenue and no more. If the tax rate is set to 32 percent the immediate short-term revenues will be maximum, but GDP will be below maximum, and investment will be less. In the long run revenues will be suboptimal. This implies a mixed strategy if there is existing debt. The initial tax rate can be set to 32 percent until the debt is paid down, at which time the rate is changed to 21 percent so as to maximize GDP thereafter. Our objective is to maximize economic growth not revenues. We will discuss taxation in capitalism below.

Taxation in Capitalism

Capitalism, socialism and socialist policy are often confused and therefore require some clarification if taxation is to be understood. Capitalism is an economic methodology in which decisions about what to produce, how much to produce, when to produce and where to produce are made by private businesses. Businesses require roads to get products to the marketplace where they can be purchased. But said businesses are not in the business of making roads. So, businesses pay taxes to the government to hire other private contractors to build roads, airports and seaports that businesses can use. This is more effective than each business attempting to build all the roads that it needs and to exclude all other businesses from using its roads. Therefore, tax is part of the capitalist system. We make this clarification because of the confusion in which tax is often labelled as a non-capitalist socially oriented government grant or endeavor. Similarly, businesses need trained healthy workers to perform their operations. Therefore, taxes are used to provide education and healthcare. There are also the common defense and public safety of a nation. There is an optimal tax rate and that rate is 21 percent. Taxes used in this way are completely unrelated to socialism wherein the government makes the decision of what, how much, when and where to produce. There are no successful or otherwise competitive systems of socialism. They are best described as preternatural failed systems.

Social Justice

The United States of America (USA) engages in the practice of income redistribution. This is a socialist practice, independent of capitalism and socialism. In the interest of social justice, the USA introduced a minimum wage equal to what it determined to be a living wage. The minimum wage prevents poorly educated inexperienced young men and women from attaining employment. Normally, such men and women would work for low entry-level wages, gain experience, and thereby become eligible for a living or higher wage based on their acquired ability to contribute to the employer's profitability. Instead, the minimum wage creates unemployment. Said unemployed people have no collateral to borrow money to start a legal business of their own. The upshot is poverty and crime. No nation likes to be measured by its poverty, so the USA introduced welfare transfer payments to end poverty. Gramm (2024) shows that except for about 2.5 percent of people who have fallen through the cracks, poverty has been eliminated in the USA. But welfare creates dead capital. It takes human capital out of the capitalist system and reduces GDPppp. Scandinavian countries known for socialist practices do not have a minimum wage. Singapore has no minimum wage and has an enormously successful economy and a GDPppp that is 50 percent higher than that of the USA. Another income redistribution system is graduated tax brackets that are a function of income level.

Pareto (1906) observed that 20 percent of Italians have 80 percent of the Italian money. Since then, it has been observed that 20 percent of salesmen make 80 percent of sales, 20 percent of cities have 80 percent of people, 20 percent of rivers have 80 percent of water, and so on. It appears that this 80/20 distribution rule is a natural phenomenon that cannot be changed by social engineering taxation. The best we can do is to shift the distribution to the right just enough to provide a living wage for the least among us.

An economy must be careful to implement the optimal tax rate. Anything different from the optimal tax rate is deleterious to the economy. When a high-income person is taxed and the money given to a low-income person, the incentive of the high-income person to produce is reduced, and the incentive of the low-income person to work is reduced. Their combined total income is reduced. Venezuela is a perfect example of how quickly this can occur. In the limit as income redistribution continues, the total income declines to zero. See also Laffer et al. (2008,2010,2014). There is a social justice unreasoned phenomenon that leads to a kind of public tax responsibility human psychosis. There is a commonly held belief that high-income individuals make their money from the sweat of low-income individuals. It turns out that a successful billionaire entrepreneur does not spend a billion dollars per year. He can only sleep in one bed at a time, drive one car at a time, eat about three meals a day, etc. His billion dollars are invested in businesses that employ people. He spends his time working on innovations that create labor-saving and time-saving devices that improve the lives of low-income individuals. He raises their standard of living. He creates better manufacturing methods that increase production and availability and lower prices of devices, making them more affordable, especially to low-income individuals. Low-income individuals receive a greater marginal increase in standard of living than high-income individuals. For example, a family purchasing their first car benefits more than one purchasing their second car. Also, devices create more spare time in which to experience leisure. That is, the rich entrepreneur gives up his leisure time to create more leisure time for others. Any amount of tax levied on him above the optimal level will be taken out of investment, reducing employment and jobs. Even if he spends rather than investing, the purchases that he makes create jobs. Even if he hoards his money in a bank, the bank will lend it to investors who will employ people. Yet, the commonly held belief is that he does not pay his fair share of taxes. This tends to take attention away from the idea of an optimal taxation level. Whatever the object objective of government income redistribution and welfare is, be it social justice or the minimization of social unrest, or other objective, the optimal weighted average tax must be 21 percent. The gestalt that 21 percent tax rate maximizes national GDPppp does not guarantee that a 21 percent weighted average of different tax rates applied to components of income in isolation will have the same effect as a flat tax of 21 percent. If the net effect of departing from a flat tax is suboptimality, then that is the price that must be paid for the income redistribution zeitgeist.

In passing we mention that whereas it appears that the agreement to pay taxes must be an exercise in cooperation it is not. Ordinarily, one would think that the more cooperative one is the more agreeable they are to pay taxes. Paradoxically, this is not so because cooperation is an exercise in self-interest. Cooperation is *a plan and an execution thereof by participants, each with their own personal self-interest and economic gain in mind yet yielding unintended mutual benefits.* Cooperation is dyadic, involving two parties. The two parties are the producer and the consumer. It turns out that the agreement to pay taxes is an exercise in collaboration. Collaboration is *a plan and execution thereof by participants for their intentional mutual benefit of shared goals, objectives, and rewards*. Collaboration is triadic, involving three parties. In taxation the third party is the government acting on behalf of the producer and the consumer. Ridley & Nelson (2022) explain the difference between cooperation and collaboration and reports the genesis of rule *of* law via collaboration. Prior to rule *of* law there was rule *by* law wherein kings and popes were above the law. This was succeeded in the year 1215 by the first Magna Carta that was entered into by King John and the barons of England, drafted by archbishop Steven Langton. The effort was a cooperation based on self-interest. The barons were interested in lower taxes and respect from King John. King John was interested in removing the barons' gun from his head. The archbishop of Canterbury Steven Langton and Pope Innocent III were interested in appointing church leaders. And so on. It failed when self-interest was not imminently clear and forthcoming to King John, the barons, or Steven Langton, and England was plunged into civil war. King John died the next year and his son King Henry III, enlightened after ten years, reissued Magna Carta

in year 1225. It was entered into as a collaboration for the good of England that became the first rule *of* law wherein no man is above the law (see Ridley, 2025).

The remainder of the paper is organized as follows. The next section is a literature review that is focused on taxation policies, their rationale and their impact. Next is a mathematical formulation for simple and full spectrum of incomes and taxes for which the weighted average is optimal. That is followed by some conclusions and a suggestion for future research.

LITERATURE REVIEW

The distributive welfare economics literature examines how national governments can accomplish distributive justice through income taxes, commodity taxes and subsidies (Bargain 2008; Kaiser and Spahn 1989; Heady and Mitra 1980). An item of intense interest in the distributive welfare economics literature, has been the determination of the optimal tax rate which has been long studied by academicians and tax policymakers worldwide and so far produced disparate findings and conclusions (Hugetta and Luob 2023; Ray and Santra 2022; Slemrod 1990; Samuelson 1951; Diamond and Mirrlees 1951; Ramsey 1927).

Early studies in the literature on the optimal tax rates and schedules have reported mixed results on the so-called "Barro rule" (Barro 1990; Glomm and Ravikumar 1994) which holds that the growth maximizing optimal tax rate is equal to the output elasticity of public capital. More recent studies have questioned the Barro Rule (Barro 1990) that the welfare maximizing tax rate is lower than the growth maximizing optimal tax rate. For instance, Agenor 2008; and Ghosh and Roy (2004) provide evidence that the welfare-maximizing tax rate is lower than the growth maximizing tax rate while Chang and Chang (2015) provide evidence that the welfare maximizing tax rate is higher than the growth maximizing rate. However, Heady and Mitra (1980) argue that it would appear "to be generally impossible to arrive at explicit expressions for optimal linear tax rates" and tax policy. Similarly, Slemrod (1990) calls for new theories of optimal taxation based on the fact that restrictions on the aims of traditional optimal theories have failed to offer solutions to address current fiscal problems. Slemrod (1990) further holds that traditional approaches to determining optimal tax systems fail to account for resources to implement alternative tax systems.

Hugetta and Luob (2023) developed an optimal tax rate model using the Mirrlees (Diamond and Mirrlees 1971) model of optimal tax rate as a limiting case. The authors' approach is based on traditional variables from prior studies plus a new term representing urban factors such as housing prices, migration, and agglomeration effects. Based partly on earnings distribution, housing costs, and housing ownership tenure from large and small U.S. cities, the authors reported that the optimal tax rate schedule is U-shaped. Moreover, the authors concluded that urban factors raise the optimal tax rate schedule across income levels and argued that under these conditions the adoption of an optimal tax rate leads low-skilled workers to leave large productive cities.

Simula (2010) simulated Mirrlees' optimal income model after adjusting for no income effects on the supply of labor in an effort to gain insights into the solution to the optimal tax rate schedule. The author's report that a slight alteration in a laborer's skills affects only the laborer's marginal tax rate and pretax income of the laborer's less productive neighbor. Fleurbaey and Maniquet (2007) sought to answer the critical question of whether to help low-skilled workers or allow hardworking workers to reap the benefits otherwise attributable to the hardworking low skilled workers. The authors improve on prior studies (Dworkin 1981; Pazner and Schmeidler (1974; Mirrlees 1971; Arrow 1950, 1951) that determine optimal rates of commodity taxes by accommodating a broader set of social preferences which does not rely on utility functions except for situations when ethical arguments about social preferences require a reliance on endogenous models of exogenous preferences. According to the authors, their approach improves on prior studies by accounting for different levels of compensation because of differences in skills and access to resources attributable to inequalities in skills and access to resources. The authors reported that the optimal tax system should give the greatest subsidies to the working poor with the lowest skill levels with a preference for labor over leisure. Based on their findings, the authors recommend granting tax exemption to income below full-time work at minimum wage which may imply a zero marginal tax rate.

Based on the work of Dahan & Strawczynski (2000), Li et al. (2015) used a Chinese survey of skills distribution to estimate the optimal average and marginal tax rates. The authors reported that both the average and marginal tax rates increase with the level of skills but that the optimal tax flattens with increasing skill levels. The authors further reported that the actual average and marginal tax rates are very different from the optimal average and marginal tax rates. Based on their findings, the authors reported that the maximum tax rate on individual taxpayers is about 25 percent, which is much lower than the then existing rate of 45 percent. Moreover, the authors concluded that individuals with incomes of 2,000 yuan or less should receive a subsidy of about 7.27 percent. Despite their claim of optimization, there was no statement of what was maximized or minimized.

With respect to commodity taxes, Majumder, Ray & Santra (2022) proposed a new methodology for determining the optional gross sales tax rate in India based on earlier studies (e.g., Ramsey,1927; Samuelson, 1951; Diamond & Mirrlees, 1951). The authors used a Quadratic Almost Ideal Demand System (QUAIDS) used by Banks et al. (1997) in an earlier study in the estimation of optimal commodity tax rate. The QUAIDS adopts a flexible demand model which allows for an arbitrary approximation of demand systems. According to the authors, the presence of the quadratic term in QUAIDS allows for items of necessity to become luxury or semi-luxury purchases as purchasing households move down the income levels. The authors proffer that the relatively simple computation offered by the QUAIDS offers advantage in the calculation of optimal commodity tax calculations over prior studies (Ramsey,1927; Samuelson, 1951; Diamond & Mirrlees, 1951) because it is not necessary to estimate demand of products subject to commodity taxes. The authors reported that commodity taxes are sensitive to the approach used to determine the tax and concluded that the optimal tax rate is progressive for multiple parameter values evaluated.

Likewise, Kaiser & Sphan (1989) studied the optimal structure of commodity taxes empirically with a West German population sample of expenditures and income along with evaluating ways of implementing an optimal structure through tax legislation. The authors sought to address the failure of prior studies to adequately address concerns like equity and efficiency considerations in differentiated tax rates. As part of their effort the authors developed parameters from a "consistent demand function." Next several measures of societal welfare together with potential benefits from several reform alternatives. The authors reported that efficiencies and welfare gains could be achieved by reforming the existing beyond the system in place. They further reported that a focus on harmonization rather simplicity as the desired outcome should be the goal in any reform effort.

Prior academic literature does not appear to have reached a consensus on an optimal tax rate. One interesting question is whether to reduce income inequalities in light of the inability to attribute income inequalites to either unequal skill sets or individual differences in consumption or leisure (see Fleurbaey & Maniquet 2007). The empirically obtained range of corporate tax rates around the world varies from a low of 2 percent to a high of 39 percent. This is evidence that policymakers and practitioners have not reached a consensus either. There is no consensus on what criteria should be used to determine the optimal tax rate. Should it be to maximize national income or to minimize inequity of hardworking low-skilled workers in a free market? This paper builds on prior studies that analytically derive the optimal income tax rate based on the criterion that GDPppp must be maximized to attain maximum growth rates and income levels. Our approach presumes that the optimal tax rate should not penalize wealth emanating from entrepreneurship and risk taking, nor should it penalize hardworking low skilled low-income workers.

MATHEMATICAL FORMULATION

Ridley (2018, 2020) and Ridley & Llaugel (2020) presented the first CDR economic growth model that explains 90 percent of GDPppp (see Appendix A). The nominal CDR uses the total market capitalization as the measure of capital. In early years, capital is exogenous. The genesis of capital is human imagination and creativity. Human capital is converted into endogenous fixed stock of capital in the form knowledge, machines, computer codes, recordings, etc. Endogenous capital stock can generate GDP until it is fully depreciated. Because of depreciation new investment must be made continuously. In the steady state as

time progresses, total capital comprises a fixed ratio of new exogenous and existing endogenous components. The CDR model that includes endogenous capital will always be biased in the least squares regression coefficients. Ridley (2018) derives a two stage least squares (2SLS) unbiased model for estimating GDPppp from exogenous entrepreneurship capital.

Ridley (2022) used the unbiased CDR model to compute the optimal tax rate that maximizes GDPppp. The optimal rate is 21 percent. This optimal value applies to the total of all taxable incomes. The components of income include individual income tax, corporate income tax, payroll tax, sales tax, property tax, social insurance tax, commodity tax, excise tax and tariff. Each of these components may be taxed at different rates. We wish to determine the optimal weights that when applied to these incomes will result in a weighted average tax that amounts to 21 percent. Coincidentally, beginning in 2018, the Tax Cuts and Jobs Act (P.L. 115-97) replaced the graduated corporate tax structure with a flat 21 percent corporate tax rate. So, we will start with the simplest case of flat individual and corporate income tax rates. Then we will maintain a flat corporate and vary the other taxes in our investigation.

A Simple Flat Individual Income and Corporate Income Tax Rate Formulation

Let I_I denote individual income,

I_c denote corporate income,

T_I denote individual income tax rate,

T_c denote corporate income tax rate,

$T_{optimal}$ denote combined weighted average tax rate,

Then the total tax paid divided by the total income earned must equal the combined weighted average tax rate. We are only interested in the optimal tax rate as follows:

$$\frac{T_I I_I + T_c I_c}{I_I + I_c} = T_{optimal}$$
$$T_I I_I + T_c I_c = T_{optimal}(I_I + I_c) = T_{optimal} I_I + T_{optimal} I_c$$
$$(T_I - T_{optimal}) I_I + (T_c - T_{optimal}) I_c = 0$$

We know from Ridley (2022) that $T_{optimal}$=21 percent =0.21per unit for maximizing GDPppp. This is the worldwide optimal tax rate obtained from the Ridley (2020) capitalism, democracy, rule of law (CDR) economic growth model and represents a universal constant.

Therefore,

$$(T_I - 0.21) I_I + (T_c - 0.21) I_c = 0 \quad (1)$$

For example, the year 2023 population was 334,914,895. Total individual income was \$23T (\$69,825 per capita). Corporate income tax was \$475B. Dividing by the corporate tax rate of 0.21 puts corporate income at \$2,261B. The total tax collected by the government was \$4.44T. Substituting into equation (1).

$$(T_I - 0.21) 23 \cdot 10^{12} + (T_c - 0.21) 2{,}261 \cdot 10^9 = 0$$
$$23 \cdot 10^{12} T_I + 2{,}261 \cdot 10^9 T_c = 0.21 \cdot 23 \cdot 10^{12} + 0.21 \cdot 2{,}261 \cdot 10^9$$
$$23 \cdot 10^{12} T_I + 2{,}261 \cdot 10^9 T_c = 5.30481 \cdot 10^{12}$$

If the individual tax rate is 21 percent and the corporate tax rate is 21 percent, then

$$23 \cdot 10^{12} \cdot 0.21 + 2{,}261 \cdot 10^9 \cdot 0.21 = 5.30481 \cdot 10^{12}$$

But if the individual tax is reduced to say 20 percent, then the corporate rate must be increased to 31 percent to maintain the same total tax revenue to 2 decimal places as follows:

$$23 \cdot 10^{12} \cdot 0.20 + 2{,}261 \cdot 10^{9} \cdot 0.31 = 5.30091 \cdot 10^{12}$$

But if the individual tax is increased to say 22 percent, then the corporate rate must be reduced to 11 percent to maintain the same total tax revenue to 2 decimal places as follows:

$$23 \cdot 10^{12} \cdot 0.22 + 2{,}261 \cdot 10^{9} \cdot 0.11 = 5.30871 \cdot 10^{12}$$

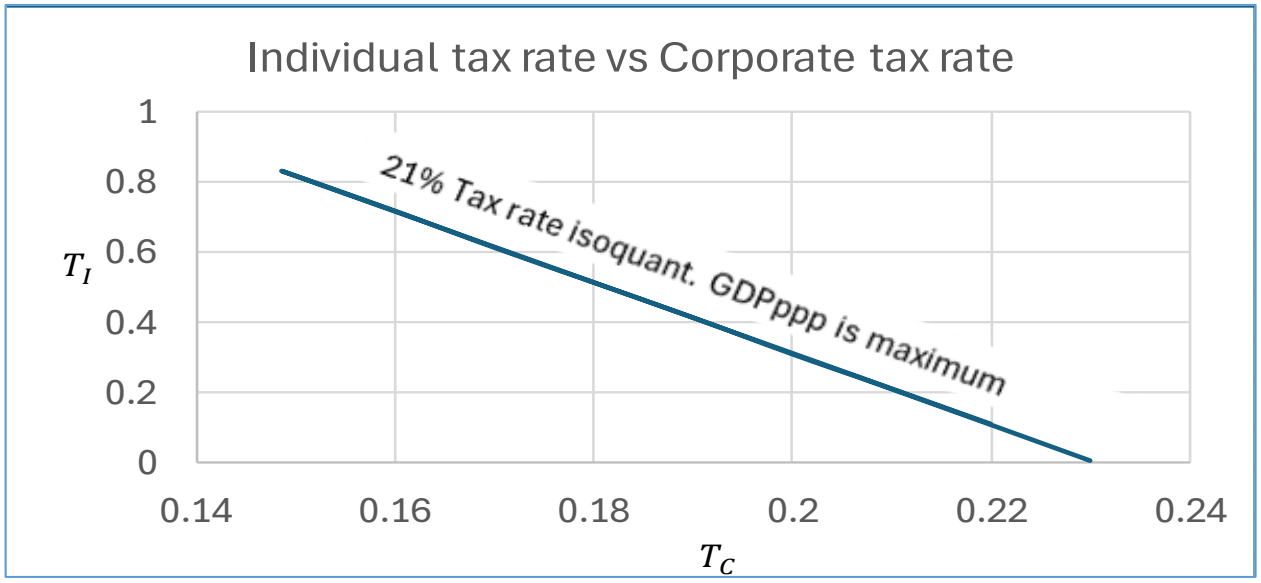
A graph of individual income tax and corporate income tax rate combinations that maximize GDPppp is shown in Figure 1. Individual income is about 10 times greater than corporate income and the individual tax income is far more sensitive to that from corporate income. This line represents a tax rate and a GDP PPP isoquant. Policymakers can choose any combination of individual and corporate tax rates that fall on the line and the weighted average tax rate will be 21 percent, and GDPppp will be the maximum. If the combination falls off the line GDPppp will fall. Consider for example if the corporate tax rate is 23 percent, no individual tax is necessary. At the other end if the corporate tax rate is 15 percent, the individual tax rate is 82 percent.

TABLE 1
THE 2022 TAX BRACKETS FOR INDIVIDUAL FILERS

Tax rate percent	For incomes of single filers over the amount shown in $	For incomes of married filing jointly over the amount shown in $	For incomes of head of households over the amount shown in $	Number of returns (total=129,330,365)	Income taxed at rate $"000" (total=$11,709,072,653)
37	578,125	693,750	587,100	3,126,765	1,220,238,804
35	231,250	462,500	231,250	3,126,765	438,042,962
32	182,100	364,200	182,100	4,837,287	283,596,982
24	95,375	190,750	95,350	16,960,092	1,155,820,988
22	44,725	89,450	59,850	50,130,828	2,075,527,742
12	11,000	22,000	15,700	124,311,717	4,729,806,841
10	0-11,000	0-22,000	0-15,700	128,237,363	1,720,932,241
0				10,448,218	85,106,093

Source: Internal Revenue Service Statistics of Income Bulletin & Corporate source book (Table 3.6)
https://www.irs.gov/statistics/soi-tax-stats-individual-income-tax-returns-complete-report-publication-1304#_sec4

FIGURE 1
21% ISOQUANT OF INDIVIDUAL INCOME TAX AND CORPORATE INCOME TAX RATE COMBINATIONS THAT MAXIMIZE GDPppp



A Variable Individual Income and Flat Corporate Income Tax Rate Formulation

The individual income is made up of taxpayers who are in different tax brackets and categories. In general, let the incomes in the lowest, second lowest, third lowest, fourth lowest, fifth lowest, sixth lowest and seventh lowest tax bracket be denoted by I_1, I_2, I_3, I_4, I_5, I_6, I_7. Similarly, let the income tax rate for incomes in the lowest, second lowest, third lowest, fourth lowest, fifth lowest, sixth lowest and seventh lowest tax bracket be denoted by T_1, T_2, T_3, T_4, T_5, T_6, T_7. Then the total tax paid divided by the total income earned must equal the combined weighted average tax rate that is optimal.

$$\frac{T_1I_1+T_2I_2+T_3I_3+T_4I_4+T_5I_5+T_6I_6+T_7I_7+T_cI_c}{I_1+I_2+I_3+I_4+I_5+I_6+I_7+I_c}=T_{optimal}$$

For example, the most recent year 2022 for which all tax rates and brackets are available is given in Table 1. The corporate income was $2,022,380,952,381 (about $2.022T). The average year 2022 per capita income was $66,775, the population was 338,289,857 and total income $22.5T. The taxable income was $ 11,709,072,653K.

The individual tax rate component is calculated as follows.
Individual tax ($K) = 0.10 · 1,720,932,241 + 0.12 · 4,729,806,841 + 0.22 · 2,075,527,742 + 0.24 · 1,155,820,988 + 0.32 · 283,596,982 + 0.35 · 438,042,962 + 0.37 · 1,220,238,804
= $2,169,237,614K
Individual income = $11,623,966,560K
Individual tax rate = (2,169,237,614/11,623,966,560) · 100 = 18.6 percent
The corporate tax rate component we know is =21 percent.
The question we are interested in is how these two rates combine.

The combined individual and corporate tax rate is calculated as follows.
The weighted average tax paid = Individual tax + Corporate tax
$K = 0.10 · 1,720,932,241 + 0.12 · 4,729,806,841 + 0.22 · 2,075,527,742 + 0.24 · 1,155,820,988 + 0.32 · 283,596,982 + 0.35 · 438,042,962 + 0.37 · 1,220,238,804 + 0.21 · 2,022,380,952.381

= $2,593,937,613K
Total income ($K) = 1,720,932,241 +4,729,806,841 + 2,075,527,742 + 1,155,820,988 + 283,596,982 + 438,042,962 + 1,220,238,804 + 2,022,380,952.381
= $13,646,347,512K
Weighted average tax rate = (2,593,937,613/13,646,347,512) · 100 = 19 percent

The combined weighted average of individual (18.6 percent) and corporate (21 percent) is 19 percent, less than the corporate rate of 21 percent. To make the combined rate equal to the optimal rate, the tax bracket tax rate can be scaled up by multiplying by 21/19. Applying the rescaling, the tax rates are (0, 10, 12, 22, 24, 32, 35, 37)x(21/19) percent =(0, 11, 13.2, 24.2, 26.4, 35.2, 38.5, 40.7) percent. As a practical matter and to promote ease of understanding these rates can be rounded to the nearest whole number. The new weighted average rate is (2,593,937,613(21/19)/13,646,347,512)·100≈21 percent, the optimal rate. The rates within brackets can be varied provided that rate increases in some brackets are offset by rate reductions in other brackets, such that when weighted due to bracketing, the result in a combined rate of 21 percent.

Pre 2018 Tax Cuts and Jobs Act

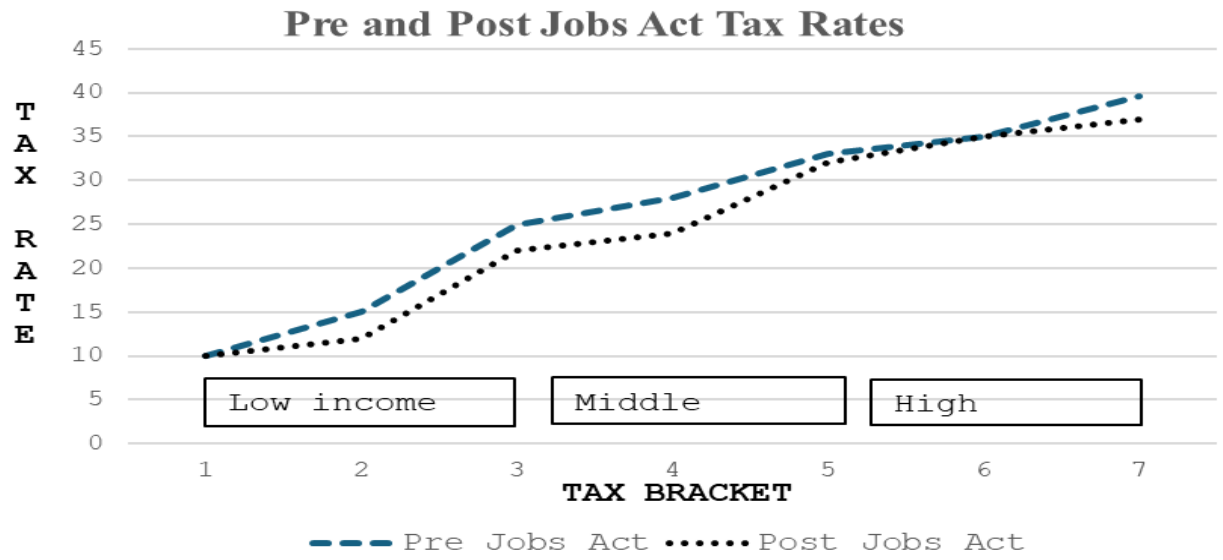
We were curious to know what the combined tax would be if the bracketed rates were returned to the pre 2018 Jobs Act rates of 10, 15, 25, 28, 33, 35, 39.6%.

The individual tax rate component is calculated as follows.
Individual tax ($K) = 0.10 · 1,720,932,241 + 0.15 · 4,729,806,841 + 0.25 · 2,075,527,742 + 0.28 · 1,155,820,988 + 0.33 · 283,596,982 + 0.35 · 438,042,962 + 0.396 · 1,220,238,804
= $2,454,192,669K
Individual income = $11,623,966,560K
Individual tax rate = (=$2,454,192,669/11,623,966,560) · 100 = 21.1 percent
The corporate tax rate component we know is =21 percent.

The combined individual and corporate tax rate is calculated as follows.
The weighted average tax paid = Individual tax + Corporate tax
$K=0.10·1,720,932,241+0.15·4,729,806,841+0.25·2,075,527,742+0.28·1,155,820,988+0.33·283,596,982+0.35·438,042,962+0.396· 1,220,238,804+0.21·2,022,380,952.381
=$2,878,892,669K
Total income ($K)=1,720,932,241+4,729,806,841+2,075,527,742+1,155,820,988+283,596,982+438,042,962+1,220,238,804+2,022,380,952.381
=$13,646,347,512K
Weighted average tax rate = (2,878,892,669/13,646,347,512) ·100=21 percent

Remarkably, the pre-2018 Jobs Act rates result in exactly the optimal CDR tax rate of 21 percent. The current post 2018 Jobs Act rates are redistributed to favor the low and middle-income brackets (see Figure 2). That is, it favors the middle-class income earners. Rescaling them up as suggested above does not change the distribution. So, it does achieve optimal tax rates while favoring low- and middle-income earners.

FIGURE 2
PRE JOBS ACT AND POST JOBS ACT TAX RATES



CONCLUSIONS

This paper shows how to set statutory tax rates such that the weighted average rate for all individual income tax brackets and corporate income tax approximates the rate of 21 percent. Individual income is many times greater (10x) than corporate income tax rate. Therefore, individual income tax revenue is far more sensitive to tax rate than corporate income tax revenue. The relationship between individual tax rates and corporate tax rates is an isoquant, where the optimal combined rate is 21 percent and GDP per capita is maximized. If the combination falls off the isoquant line GDPppp will fall.

When the corporate rate is set to the optimal value of 21 percent, the individual tax rate is 18.6 percent and the weighted average rate is 19 percent, below the optimal rate of 21 percent. The individual rates were rescaled by a factor of 21/19 to raise the weighted average to 21 percent. This is illustrated with corporate income and individual income for the year 2022 and for all tax brackets and incomes pertaining thereto. This is sufficient to describe the idea of optimizing the tax rate for gross domestic product. At the time of this writing (2025), the current US tax rates are about to expire. These optimal rates should be extended indefinitely, but not necessarily in scope. The individual tax brackets and tax rate distribution can be varied by policymakers provided that their weighted average rate results in 21 percent. Rate increases in some brackets should be offset by rate reductions in other brackets.

Future research may extend the list to other years and components of tax, including payroll tax, sales tax, property tax, social insurance tax, commodity tax, excise tax and tariffs.

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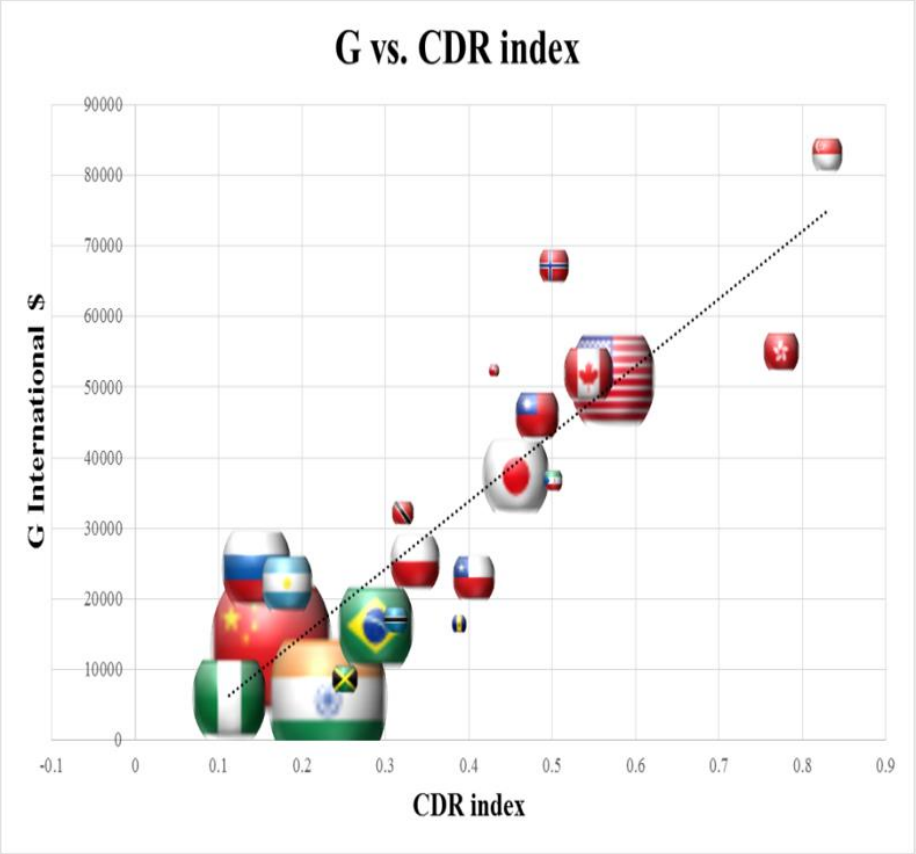
APPENDIX 1: CROSS-COUNTRY CDR ECONOMIC GROWTH MODEL



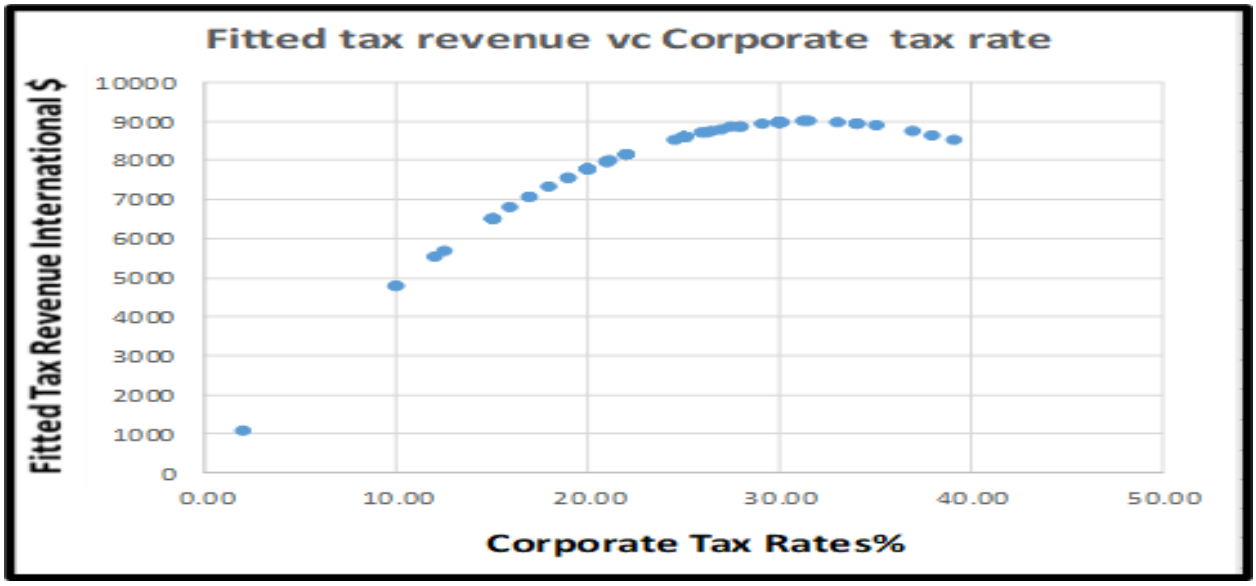
Argentina
Barbados
Bermuda
Botswana
Brazil
Canada
Chile
China
Equatorial Guinea
Hong Kong
India
Jamaica
Japan
Nigeria
Norway
Poland
Russia
Singapore
Taiwan
Trinidad & Tobago
United States

Year 2014 *G* vs CDR Index for 79 countries (line). Bubble size (21 countries) is the square root of population. This model was re-estimated for years 1995 to 2016 with similar results.
For additional comments on the countries listed see Ridley (2020).

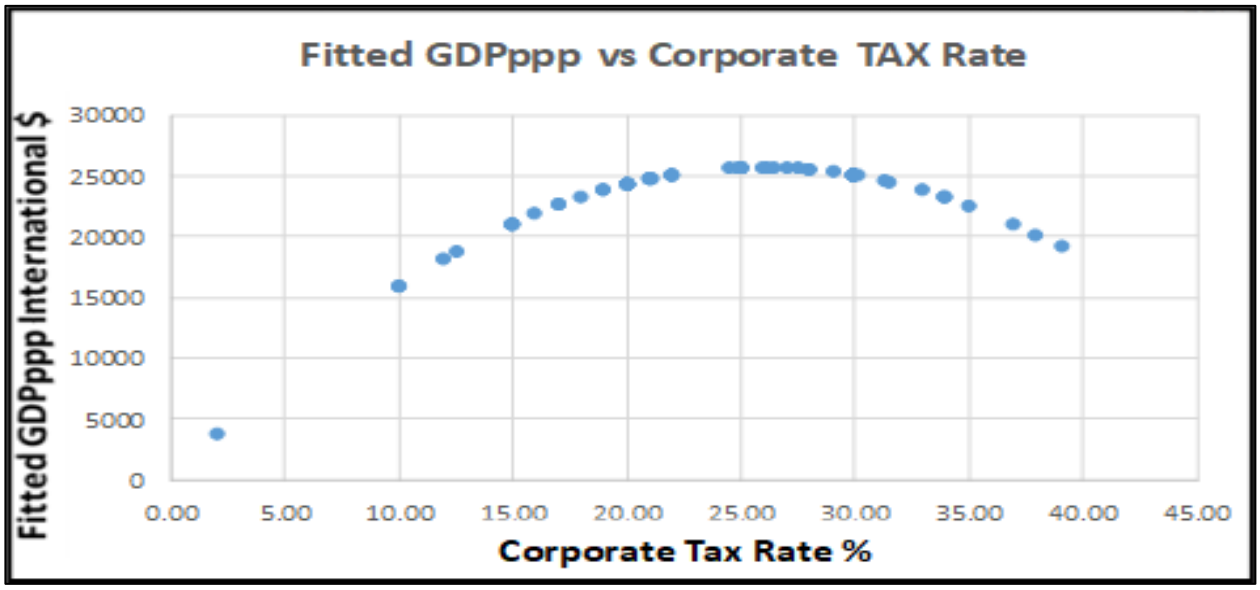
$\hat{g}=1.53C+0.14D+0.23R-1.21CDR+0.38N \quad R^2=0.9$

$G=\hat{g}$ (GDPppp highest-GDPppp lowest) +GDPppp lowest)

APPENDIX 2



Empirically obtained year 2020 fitted tax revenue is maximized at a corporate tax rate of 32%



Empirically obtained year 2014 fitted GDPppp is maximized at a corporate tax rate of 26%.