ENTREPRENEURSHIP

Dr. Dennis Ridley

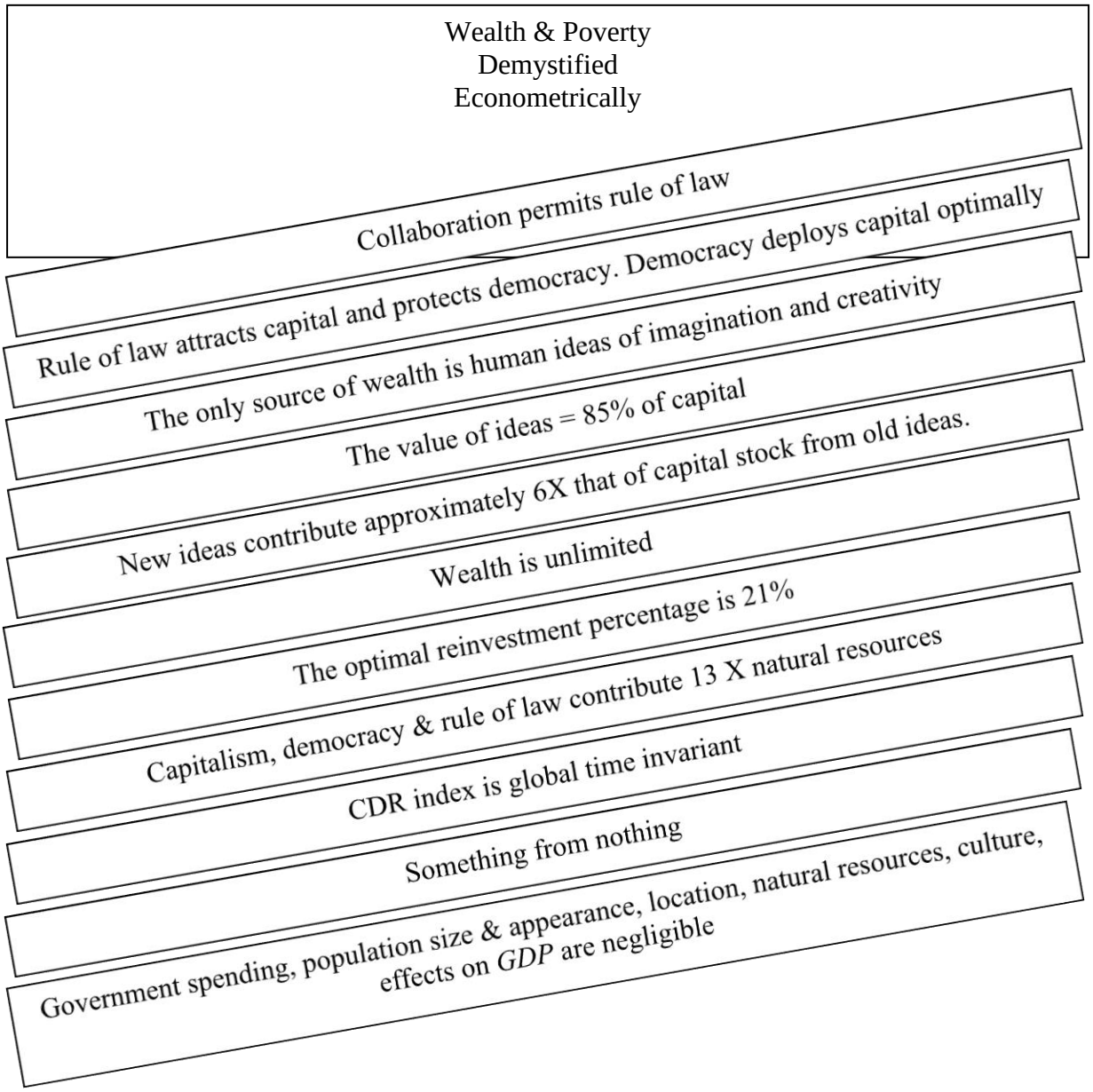
Wealth

explained by

Capitalism.Democracy.Rule of law

General theory of economics

CDR supply side scientific growth law unveiled
from confusion to clarity



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Wealth

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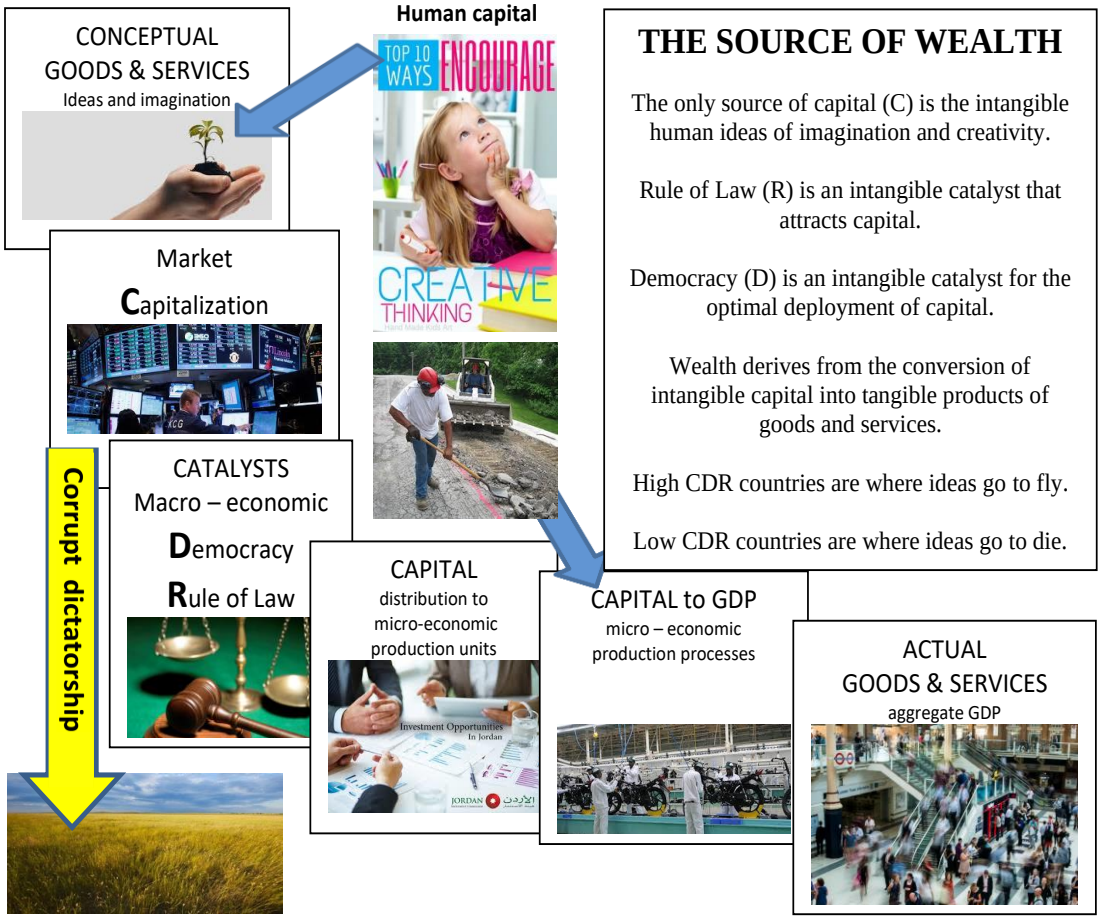
Capitalism.Democracy.Rule of law

Wealth & Poverty Demystified Econometrically

General theory of economics

CDR supply side scientific growth law unveiled
From confusion to clarity

One source of wealth watches over another



COLLABORATION

COLLABORATION *trumps* IQ

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About the Author

Dr. Dennis Ridley studied Electrical Engineering at Middlesex University in England and the University of the West Indies, where he received the Master of Science degree in Computer Methods in Electrical Power Systems Analysis. He received his PhD degree in Engineering Management from Clemson University, USA. He has the distinction of a US patent, publication in the Journal of the Royal Statistical Society, US State Department Fulbright Senior Specialist at Kharkov University in Ukraine and Harvard Business School certificate in The Art & Craft of Discussion leadership.

Currently, he is a Professor in the School of Business &Industry at Florida A&M University, and a Faculty Associate in the Department of Scientific Computing at Florida State University. Previous appointments include Howard, George Mason, and Clemson Universities, Nekoosa Packaging Corporation, Radio Corporation of America, Jamaica Public Service Co., and the International Atomic Energy Agency in Vienna, Austria.

He is widely published in the fields of electrical, industrial & biomedical engineering, economics, finance, management science, operations research, time series analysis, statistics, supply chain management and entrepreneurship. His professional societies have included the Institute for Operations Research and Management Science, the International Institute of Forecasters, the Institute of Business Forecasting, the American Statistical Association, and the Production & Operations Management Society.

He is the father of the computer-powered wire(less) ultra-intelligent real-time monitor, antithetic time series analysis, the moving window-spectral method, the CDR economic growth index, the professorial evaluation metric, live case study pedagogy, Andrew Ridley and Jon Ridley.

Dr. Ridley has served as an accreditation visitation team member in service to the University of the District of Columbia, Seton Hall University, State University of New York and Rutgers University.

PREFACE

This book is a companion to *The Mystery of Wealth* (Ridley, 2020a) - *the first complete economic theory of entrepreneurship.* The path to widespread and accelerated entrepreneurship. The purpose of these two books is to demystify the causes of wealth and poverty like never before done. *The Mystery of Wealth* was the seminal comprehensive presentation of the CDR index. The CDR index is a mathematical model that shows how capitalism (C), democracy (D) and rule of law (R) jointly with natural resources and geography explain almost all economic growth. Rule of law attracts capital and democracy creates additional pathways for the optimal deployment of capital. As the CDR index is raised so is the real per capita gross domestic product adjusted for purchasing power parity. So, the question is how to raise the CDR index of a country. This book identifies the key lever as collaboration. Hence its title.

The book will serve the needs of individuals who wish to gain a basic understanding of national wealth and the macro-economic growth and decision making that is responsible for wealth. The reader may start with a preliminary review of the information at CDRindex.blogspot.com and here in Chapter 1. The blog is intended for anybody, especially persons with a high school education and beyond. Chapter 1 explains wealth in general terms. It contains a summary of conclusions that flow from the basic CDR fact that the source of all wealth is human capital ideas of imagination and creativity. Cooperation is required for ordinary economic growth but through collaboration human capital is converted into capital stock of knowledge, machines, recordings, etc. that are used to create new products and services, and therefore extraordinary economic growth. It contains many conclusions that are counterintuitive and different from commonly held beliefs. Chapters 2 and beyond are intended for college and university students, and professionals. It is anticipated that through the study of entrepreneurship, students might gain a sense of ownership and purpose that places higher value in their own education. They might also become more supportive of the minority of students who choose entrepreneurship for a career and will likely pioneer future wealth building for society as a whole.

Chapter 2a explains the relationship of collaboration to rule of law.

Chapter 2b considers how psychology and epigenetic transgenerational sequela can impact collaboration skills.

Chapter 3 is a comparative investigation into the relative impacts of collaboration and intelligence on standard of living.

Chapter 4 investigates the distributional characteristics of economic growth and the inevitable Pareto effect and wealth inequality that it contains. Collaboration in high-income and low-income populations is explored for the purpose of pursuing labor-saving products by the high-income entrepreneur and a good living standard for the least amongst us.

Chapter 5 investigates the relationship between collaboration and economic development for the purpose of human development, over and above income.

Chapter 6 investigates the prevalence or lack thereof of collaboration across the countries of the world. It makes some suggestions for raising the level of collaboration and concomitant economic growth and development via the CDR index.

Chapter 7 determines the optimal reinvestment rate as a percentage of real per capita gross domestic product adjusted for purchasing power parity that permits maximal continued economic growth.

Chapter 8 gives an in-depth analytical account of a four-dimensional depiction of the CDR model. The concepts of divergence and curl are introduced to economic growth modeling. These

are applied to the explanation of GDP and economic efficiency in terms of the convergence of C, D and R into a vector valued function of GDP. This permits the calculation of expected long term growth, current world average GDP, maximum one year growth, and rate of return on investment.

Chapters 9a through 9e constitute a suite of pedagogical propositions for teaching through collaboration, legal environment of business, entrepreneurial finance, entrepreneurial psychology, and how to objectively evaluate the learning efficacy of collaborative teaching. Examples of objective teaching evaluation are given in Llaugel & Ridley (2018) and Korovyakovskya, Llaugel & Ridley (2020).

Chapter appendices that include supporting information for a chapter are placed at the end of the chapter. Global appendices that support multiple chapters are placed at the end of the book and are named with double letters. Appendix AA contains a nomenclature of economic terminology that is developed specifically to explain the CDR growth model, how it works, and how it is developed through collaboration. Appendix BB contains data and the regression results and chart that depicts the source and mechanism of wealth. Appendix CC contains a question-and-answer review that compares traditional economic growth concepts with the CDR economic growth model that is based on collaboration.

CHAPTER 1

Introduction

Collaboration permits rule of law which attracts capital formation and protects democracy that raises CDR and GDP.

We know from the companion book "The Mystery of Wealth" that economic growth is determined by the policy variables capitalism, democracy, rule of law (CDR) model. When natural resources and geography are added to the model, it explains approximately 90% of real per capita gross domestic product adjusted for purchasing power parity (GDPppp-international dollars). It is most impressive how few variables are required for explaining GDPppp. This is in keeping with the parsimonious principle of Achem's Razor. These place growth economics on a sound scientific footing. The question remaining is how does a country raise its CDR in order to raise its GDPppp? This book shows that collaboration is responsible for inventing, permitting, and promoting rule of law, thereby raising CDR and in turn, GDPppp. Our objective is to explain and motivate entrepreneurship.

Charles Darwin (1809-1882) might be paraphrased as having said "it is not the strongest of the species that survive, nor the most intelligent, but the one most responsive to change." How is it that intelligence isn't what matters most? We all wish that we were intelligent. That we lived in a country of intelligent people. But rarely do we explicitly express a desire to collaborate. Intelligence is recognized as natural to the human being. Collaboration is not. But collaboration is a uniquely human ability (Tomasello, 2001, 2019). The human being is capable of cooperation. Cooperation is practiced when people work together towards individual goals while benefiting each other unintentionally. An example of this practice is division of labor, trade, and exchange. Individual gain is what the parties have in mind. The economic gain of all parties involved is acquired unintentionally. This enables ordinary economic growth and development. But human beings are also capable of collaboration. Collaboration is practiced when people work together intentionally towards shared goals and rewards. This enables the exercise of human ideas of imagination and creativity for innovation and the invention of devices and services not previously in existence. The greatest ideas have humble origins. Ridley (2020a) calculated the value of ideas at 85% of total capital and showed that new ideas contribute 6 times that of capital stock from old ideas. What is now real was imagined first. This in turn enables extraordinary growth and development. We recognize that human ideas of imagination and creativity is the sole source of capital. Under corrupt autocratic dictatorship, access to this capital is barely possible. In a free society, rule of law attracts such capital and protects democracy. Rule of law is an invention made possible by collaboration. Cooperation is an obstacle to the invention of rule of law because of the impossibility to resolve conflicting individual goals. Intelligence is not sufficient (see chapters 3 & 6). Hence, we title of this book *Collaboration trumps IQ* and begin our investigation in chapter 2a with collaboration and rule of law enroute to our objective of entrepreneurship and wealth (*see also CDRindex.blogspot.com*).

Rule of law is a catalyst that creates the stability that attracts capital.

Corruption is the opposite of rule of law and repels capital. There are many aspects of rule of law that are not obvious to the average citizen. They are opaque for the most part. But everybody understands corruption and the absence of justice. Corruption in high places has a way of filtering down to the common man. Then, it is difficult to convince anybody to do an honest day's work for what they perceive as unfair, or to apply their capital in any significant way. Hence the flight of capital. See figure 1 for high and low corruption countries.

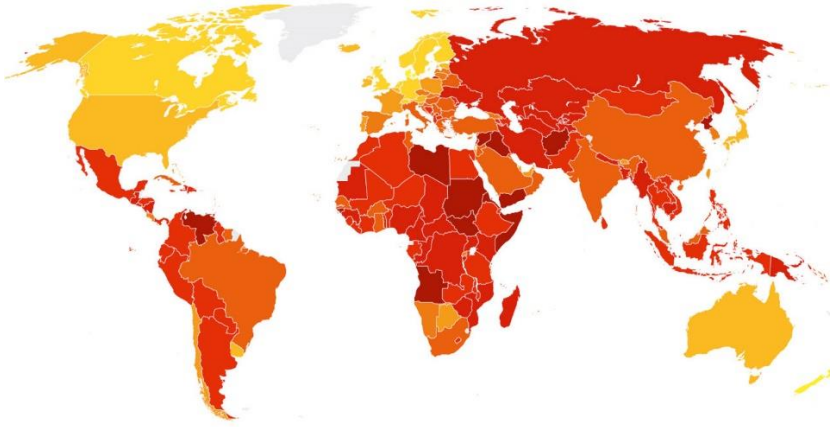


Figure 1. Corruption Perceptions Index 2016. Lighter color less corruption. Darker color more corruption. Visit www.transparency.org/cpi for more information

We begin this book with the topic of collaboration and rule of law because that is where a low income or otherwise underperforming nation should begin. Without collaboration there can be no rule of law. Without rule of law there can be no organized capital. With no organized capital there can be no GDPppp to speak of. But our research did not begin with collaboration and rule of law. In the *Mystery of Wealth* we discovered the positive impact of CDR on raising GDPppp. We knew that CDR was responsible for the industrial revolution and the massive increase in wealth in the high CDR countries (see Figure 2).

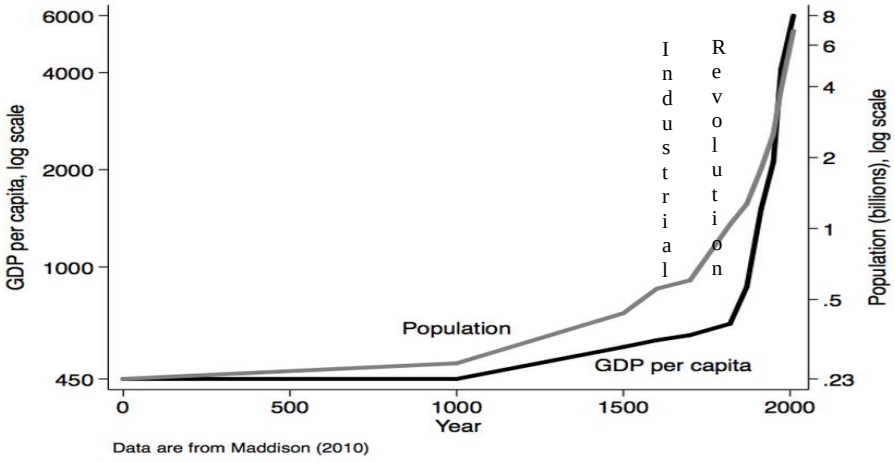


Figure 2. Before and after the industrial revolution

Language and Collaboration

The industrial revolution occurred in England. It could have occurred anywhere in the world that the appropriate combination *C*, *D* and *R* might have existed, but it occurred in England. In addition to rapid economic development, this led to English hegemony, albeit with mixed sentiments in their colonies. The English took their language to one fifth of the world. The sun never set on the British empire. Communication is an essential tool for collaboration. For that we need language. A unique feature of English comes from the design of the English dictionary. New words are only added to various Spanish, French, Russian, etc. dictionaries when a committee of elite intellectuals decides that a word is worthy. This results in relatively small dictionaries. On the other hand, new words are added to the English dictionary when their usage becomes common, regardless of who may or may not approve. Therefore, English has become the language of democracy. The result is a larger dictionary with more words to express human ideas of imagination and creativity. The very source of wealth. It is the ultimate language for collaboration.

Active Learning and Collaboration

The discovery of the impact of collaboration came from a study of active learning teaching methodology. Collaboration was the only plausible explanation of why active learning teaching raised test scores and normalized the probability distribution of test scores. Only after that discovery did we recognize the importance of collaboration to rule of law, CDR, and GDPppp. The story is as follows.

I and two colleagues conducted an experiment in active learning (see Figure 3 and chapter 9a). What we learned from that is that active learning resulted in better grades. Moreover, test scores that would otherwise be multimodal nonnormal became unimodal normally distributed. As best we can tell the outcome is due to the effect of student-student collaboration that is implicit in active learning. This was the genesis of our understanding of collaboration. So, an interesting question is what are the implications of greater learning and collaborative training for society and the economy as a whole? Greater learning will have positive outcomes of competence and the ability to apply learning to job challenges. But the other benefit is the collaboration skill that students acquired. Many jobs and tasks may require collaboration and collaborative skills. To investigate this possibility, economic growth and development were compared with collaboration. The outcome was a convincing positive correlation (see chapters 4 and 5). One would expect that intelligence would be the major factor in economic growth and development. So GDPppp was regressed simultaneously on collaboration and IQ. Amazingly, collaboration was seen to be statistically highly significant, and IQ was not significant. IQ was a non-factor (see chapter 3). See also Surowiecki (2005) for an explanation of how the wisdom of a group can yield a superior decision compared to that of any one member, even when that member is a superior individual with superior intelligence and credentials. These also are reasons why we titled this book *Collaboration trumps IQ*.

Figure 3. Student-Centered Active Leaning environment classroom setting

Capitalism, Democracy and Rule of Law

Entrepreneurship is the process of starting a business, typically a startup company offering an innovative product, process or service. The true source of wealth is entrepreneurial capital. The economy achieves what the mind believes. Capital comprises intangible exogenous human entrepreneurial ideas of imagination and creativity, and capital stock of knowledge (skills and memory), and tangible endogenous machinery, recordings, computers, etc. Capitalism is a method of organizing capital for the purpose of profitable investment. Rule of law is an intangible exogenous catalyst that creates stability for attracting capital. Democracy is an intangible exogenous catalyst that creates new pathways for the optimal deployment of capital. Total capital is converted into production of capital stock, goods and services, which after consumption, depreciation and obsolescence, contributes to wealth. Since capital stock is subject to continuing depreciation and obsolescence, entrepreneurship must be the true source of new wealth creation. Money is a method of accounting for wealth, not the source of wealth. But money and finance are accelerants for promoting a good entrepreneurial idea. The CDR index is a weighted average of capitalism (C), democracy (D) and rule of law (R) that jointly with natural resources and geography explain almost all economic growth. It is most impressive how straight the G vs CDR line is. Also impressive is the small number of variables posited for explaining G. This is in keeping with the parsimonious principle of Achem's Razor. We acknowledge this as the CDR scientific law. High CDR countries are where ideas go to fly. Low CDR countries are where ideas go to die (see Figure 4a).

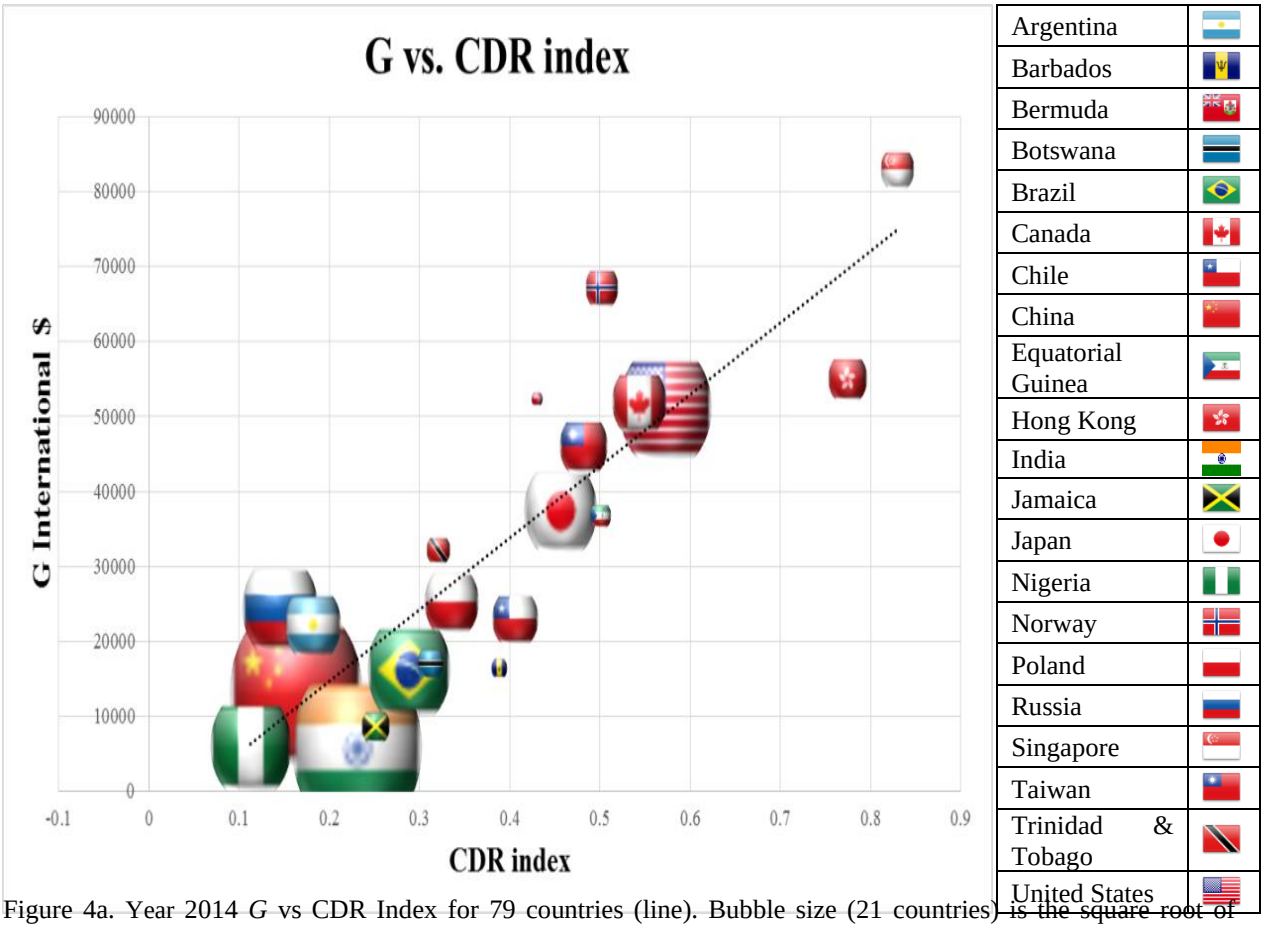
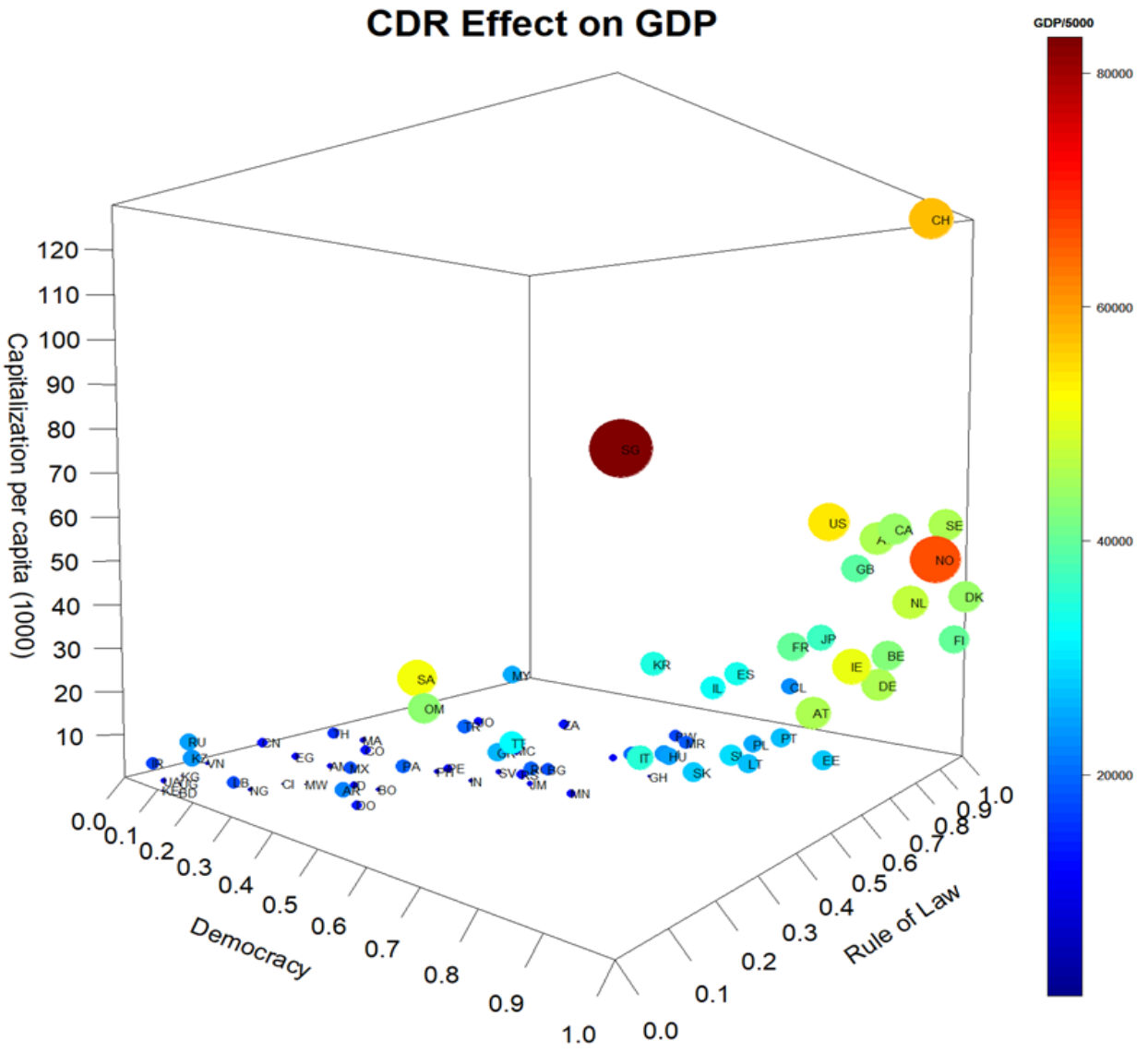


Figure 4a. Year 2014 *G* vs CDR Index for 79 countries (line). Bubble size (21 countries) is the square root of population. This model was re-estimated for years 1995 to 2016 with similar results. *G = GDPppp*.
For additional comments on the countries listed see Ridley (2020a). See Appendix BB for related data and equations.

Figure 4b is a four-dimension bubble graph that displays the policy variables *C*, *D*, *R* and the corresponding GDPppp. The sizes of the bubbles are set to GDPppp. As the size increases the bubble color go from dark blue, to light blue, to green, to yellow, to red, to dark red. As *C*, *D* and *R* increase GDPppp (bubble size) tends to increase. The capitalizations for Singapore and Switzerland are atypically very large. Switzerland is unique in its policy with respect to the attraction of capital. The highest goes to Singapore (SG). Singapore is described as a benevolent dictatorship with a low *D* rating. Its high *C* and *R* ratings more than make up for that in determining GDPppp. Its low *D* rating sets it off the trend in Figure 4b. The lowest GDPppp goes to Malawi (MW). Chapter 8 gives an in-depth analytical account of this four-dimensional depiction.



Click on the bubble graph and wait to see an animation (https://sites.google.com/view/cdr4d/home) of how GDPppp evloves with CDR.

Figure 4b. Four-dimensional bubble graph: C, D, R and GDPppp (bubble size). These data are for year 2014. Data were analyzed for years 1995-2016 and the results were the same, that is global time invariant. For additional comments on the countries listed see Ridley(2017a, 2017b). See Appendix BB for related data and equations.

The multidimensional representation and animation allow us to see how GDP evolves contemporaneously with C, D and R. It also permits us to compute the divergence and curl of GDP. The divergence is the profit from investments where curl represents investments. An interesting discovery from the divergence and curl analysis is that the expected return on investment (divergence/|curl|) is found to 9.6%. That is companies in the economy should expect to make a 9.6% return on their investment. The representation of GDP as a vector function is at the pinnacle of CDR calculus as we introduce it in this book. It is specialized and is outside the scope of prior economic thought. But its discussion in chapter 8 is accompanied with copious words and explanations to help with understanding. One should at least get the general idea.

Pursuant to economic growth and development we observe the following. Economic growth is the improvement in per capita real gross domestic product adjusted for purchasing power parity. Economic development is the improvement in infrastructure and social wellbeing. Considering how essential and preliminary rule of law is for the purpose of attracting capital we investigate collaboration and rule of law in chapter 2a.

Intranational Coordination, Cooperation, Collaboration.

The percentage of work that was team-based in 1980 was 20%. By 2010 this number grew to 80%. (Colbry, Hurwitz & Adair, R, 2014; Hollenbeck, Beersma, & Shouten, 2012). This represents a change from individuality or even cooperation to collaboration. There are more specialties now than ever before. This is especially true in science (Bennett & Gadlin, 2012). Collaboration is the only way to integrate expertise across multiple disciplines (see Figures 5).

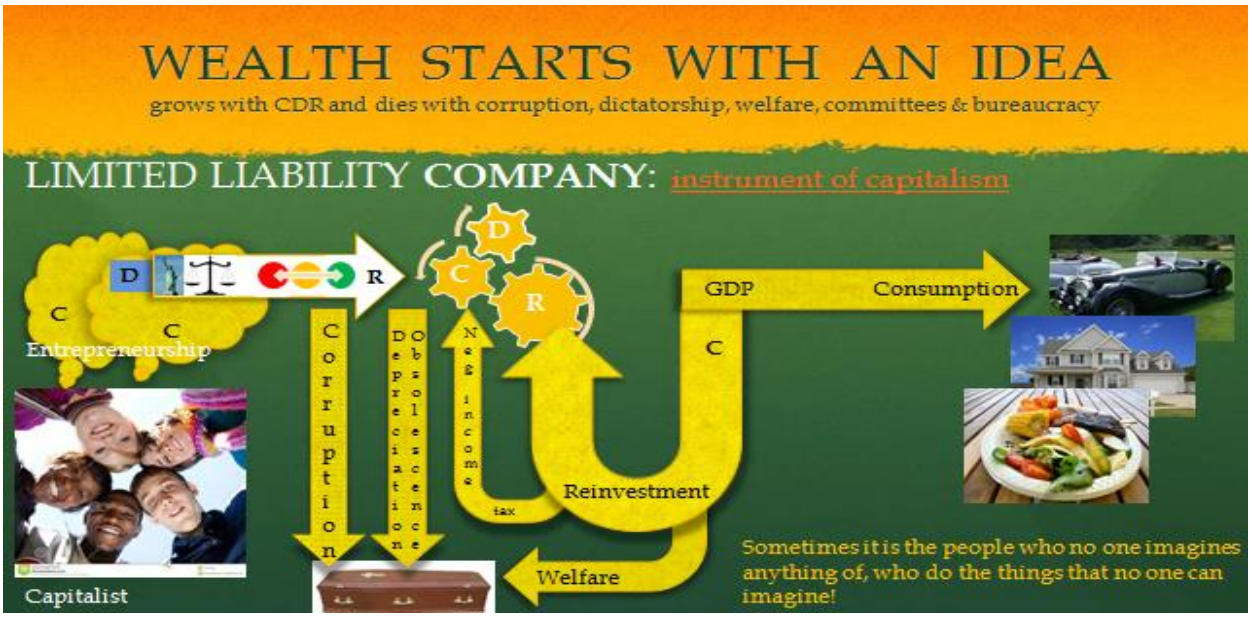


Figure 5. Capital to GDPppp generating process in the presence of catalysts democracy (D) and rule of law (R).

Coordination is the scheduling of activities. Cooperation is a plan and execution thereof by participants working together, each with their own personal self-interest and economic gain in mind yet yielding unintended mutual benefits. Collaboration is a plan and execution thereof by participants working together for their intentional mutual benefit of shared goals, objectives, and rewards. A triadic shared intentionality in theory of mind (see Figures 6 & 7, and Figures 8 & 9).

One framework is marked by the distinction between coordination, cooperation, and collaboration, with each activity being dependent upon the previous while addressing increased levels of complexity. Ridley (2020a) showed that cooperation is essential to trade and ordinary economic development. Furthermore, chapters 4 and 5 show that collaboration is essential for extraordinary economic growth and development. This is because extraordinary economic growth requires innovation. But, in chapter 2a on the accounting for Magna Carta in legal history and anthropology, it is shown quite amazingly that cooperation was an obstacle to the invention of rule of law. Rule of law is not evolutionary. It is revolutionary. Furthermore, collaboration was essential for the invention of Magna Carta. So, what we know is that coordination, cooperation and collaboration are only beneficial when applied selectively in specific combinations, to different tasks.

Figure 6. Diadic cooperation:
Contractual agreement - what's in it for me?

Figure 7. Triadic collaboration:
Trust - what's in it for us? What's in it for society?

Figure 8. People working separately.
Possible cooperation. No collaboration,

Figure 9. People working together.
Collaboration.

Applications of Collaboration

There are numerous applications where collaboration is required for success. The applications discussed in this book include but are not limited to rule of law, suffrage, economic growth, systems of taxation, economic development, and educational instruction and evaluation. We discuss collaboration and rule of law, especially the invention of Magna Carta in chapter 2a. Voting is a method of democracy and is a collaboration. Rule of law protects democracy. At the time of the vote the poorest in society is as equal and powerful as the richest. Economic growth and in particular extraordinary economic growth via innovation that creates new products and services

are discussed in chapter 4. Economic growth must occur prior to the consideration of individual or corporate income tax. In progressive systems of taxation, as in the United States of America (US), taxation is a collaboration in which the tax rate increases in accordance with rising income. The yield from taxation is best reinvested in the economy to create economic development and further economic growth. Ridley (2022a) and chapter 7 show that the optimal reinvestment rate is 17.5%. The capital consumption rate (depreciation) is 3.5%. The nominal tax rate is therefore 17.5+3.5=21%. The effective tax rate is about 11% after allowances for private tax-deductible reinvestment undertakings of 10%. How this aids in economic development is discussed in chapter 5. For persons concerned with the size of debt, we point out that this tax rate and reinvestment optimization strategy maximizes GDP such that the debt to GDP ratio is automatically reduced. Educational instruction was found to improve with collaboration. These are discussed in chapters 9a, 9b, 9c & 9d. At the elementary level teams sports are collaborative exercises. They can be used for developing collaboration skills at an early age for later use. Finally, we show how collaboration in university teaching evaluation can improve professor contributions to other professor's grades and to the grade point averages of students. These are discussed in chapter 9e and in Llaugel & Ridley (2018) and Korovyakovskya, Llaugel & Ridley (2020). The separation of powers and the interaction between the US executive, legislature, and judiciary is a collaboration. The silicon valleys of Massachusetts and California are the best examples of high technology regional collaborations. Beyond international borders, collaboration and the international legal order are discussed at the end of this introductory chapter.

High Income and Low Income collaboration

In chapter 4 we show the wealth relationship between the high-income and low-income populations. Distribution of capital is lognormal. The logarithm of capital is normally distribution. It is an idealistic belief that the distribution of capital should be equal, or at least the distribution should be uniform. Uniform means that it just as likely that one population has the same capital as another. So, while it is recognized that there is some degree of random luck, the distribution can still be uniform. In reality lognormally distributed suggests that capital is Pareto (1906) distributed. Just like Pareto found for income, twenty percent of the population will own eighty percent of the capital. That is how it was in 1906 when it was discovered, in all likelihood since the beginning of time and henceforth forever (see also Piketty, 2104). This is not as bad as it first appears to be. It is not true, as is commonly believed that successful entrepreneurs are rapacious capitalists.

As entrepreneurs become rich, they must create products and services that raise the standard of living of many more people than themselves. They rely on the sales of these products and services to the population at large. Therefore, they must produce an acceptable and ever-increasing quality at an affordable price. This effort requires a totality of dedication to the task. Ever since the industrial revolution, the number of features in devices has risen exponentially. And the real price per feature adjusted for inflation, has fallen routinely. Computers and cell phones are primary examples. To accomplish this, entrepreneurs will typically dedicate much of what would otherwise be their leisure time. Their products and services are labor saving and create more leisure time for the public. The entrepreneur gives up leisure time so that the general population will have more. The greatest beneficiaries of per centage increase in wealth are those with the least wealth to begin with. The least amongst us are better off than ever before. Wealthy entrepreneurs create philanthropic institutions that give more money to charity than any government.

Furthermore, the wealthiest person can only drive one car at a time, sleep in one bed at a time, put on one pant leg at a time, and only eat healthily three meals per day. Dishonest operators who

think they are above the law soon receive their comeuppance. It turns out that the successful entrepreneur is our creator's gift to mankind. Entrepreneurship is an act of giving. Consider for example the biotechnology company Moderna, incorporated in year 2010. Moderna invested billions of dollars in the successful mRNA vaccine for the covid19 virus. Moderna allows all able pharmaceutical companies to use their patent free of royalties. Thank goodness for the 1 percent. It may seem unfair to some that the children of the rich should inherit wealth that they did not earn. The rich pay substantial taxes when they are alive so there is no reason for them to pay again when they die. The money is theirs to give to whomever they wish. Yet they pay a hefty death tax. In any case, 90% of intergenerational wealth has an average expiration of three generations (Taylor, 2018). Children tend not to be interested in the pursuits of their parents. And the depreciating inheritance thins out rapidly as it is divided up among numerous offspring.

If the foregoing argument is unconvincing to anyone, and they insist on the righteousness of bringing down the rich, they can simply stop purchasing their products. That will teach them a lesson. But how will that work out for the poor who must then toil with their hands rather than work with labor saving devices. But what may make better sense is for the worker to purchase shares of stock in the companies they work for (or others) and participate in the financial success of the company and any voting rights appertaining thereto.

Before allowing oneself to be seduced into thinking that capitalism is rapacious, recall Adam Smith "Every individual is continually exerting himself to find out the most advantageous employment for whatever capital he can command. It is his own advantage, indeed, and not that of the society that he has in view. But the study of his own advantage naturally, or rather necessarily, leads him to prefer that employment which is most advantageous to society… He intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention. By pursuing his own interest, he frequently promotes that of the society more effectually than when he really intends to promote it." A capitalist is one who attempts to maximize one's earnings in return for one's efforts. Therefore, every rational person is a capitalist. And organizing their capital is capitalism. This is a principle of cooperation (not collaboration) that makes it possible for ordinary economic growth.

The foregoing discussion on high-income and low-income interaction involve what Adam Smith (1776) first identified as division of labor, trade, and exchange. Ridley (2020a) calculated that at equilibrium, the related activities result in an economic growth rate of 1.8%. This is identified in chapter 4 as cooperation and ordinary economic growth. But what if high-income and low-income populations can collaborate on shared goals and rewards. This opportunity for extraordinary economic growth and development is discussed in chapters 4 and 5. Suffice it say that forced labor is an uneconomical proposition that must be avoided. Forced labor destroys human capital and is immoral. Free market tenancy will result in a Pareto increase in profits of approximately 13 times that of forced labor (see Ridley, 2020 for the related calculations). Adam Smith thought that forced labor was not economically viable. By his accounting, the net product from free labor is 12 times that from forced labor (Weingast, 2015).

At the time of this writing, the world has been plunged into the Covid19 viral pandemic. This is an interesting call for collaboration between rich and poor countries. One reason for the rapid rise of the pandemic is high speed air travel. People can spread the virus from country to country in just days. Also rapid was the response of the US with its superior managerial knowhow and biotechnologies. Their development of vaccines has been at an extraordinary speed. Their deployment has been nothing short of a miracle. All this relied on collaboration like never before. And yet America is not safe from the virus once again because of high-speed air travel and the total incapacity of poor

countries to make or purchase the vaccine, or even distribute the vaccine. America has to sell the vaccine at cost to many countries and make it free to the poorest countries. Short of closing the borders and ending travel and trade, worldwide vaccination is the only way to end the virus and thereby make Americans safe. Moderna's collaboration with other pharmaceutical companies could not be timelier. This is a peculiar type of collaboration. The partners in this collaboration contribute unequally, according to means, towards a shared goal and reward. As we continue our investigation of collaboration from nation states to the world, by no means is it a case of domestic rule of law writ large, because some nations have very poor domestic rule of law. And poor enforcement is just as feckless. Nevertheless, we have some evidence of the different impacts of cooperation and collaboration on international legal order success as follows.

League of Nations

Consider first the League of Nations, an international diplomatic group founded in 1920 after the end of World War I. It was created by 42 nations to solve their disputes by diplomacy rather than open warfare. Membership expanded to 58 countries by 1934/1935. The methodology for its creation involved cooperation (not collaboration) and it failed to perform as intended. All decisions required unanimity. It was almost impossible for independent self-interested nation states to reach unanimity even when cooperating fully. A single veto unraveled majority support for change. Due to opposition from isolationists in the US Senate, the US did not join the league. This undermined the League. Furthermore, Germany and USSR were excluded, so as they gained strength and sought to reacquire lost territories, they could not discuss the terms of settlement and negotiate compromise. That inevitably led to conflict. The league of nations failed to prevent World War II which occurred only twenty-three years later. The league ended in 1946.

United Nations Organization

Consider next the United Nations Organization, an international diplomatic group founded at the end of World War II. It was created in 1945 to replace the league of nations. The methodology for its creation involves intergovernmental collaboration between countries of equal standing regardless of individual financial contribution, size or wealth. There was a shared goal. The United Nations organization has expanded to include numerous divisions, and 193 countries. It has assisted many countries to gain independence from their colonial masters. It has succeeded in preventing many wars, including another world war for more than seventy-six years. War appears to be as old as mankind, but peace is a modern invention (Maine, 1822-1888).

Collaboration in Singapore

Monetary and machine aids to poor countries are mere ephemeral analgesics. Machinery is subject to depreciation and obsolescence, and money often creates more debt and corruption than anything else. In *justice at a distance*, Lomanski and Teson (2015) note that foreign aid, whether in the form of cash or machinery, is ephemeral and often does more harm than good. Poor countries need help to raise their CDR index and thereby their GDPppp. For the most part, this can be accomplished at a distance. Instead of tackling this problem directly, it may be possible to create incentives that will raise CDR automatically. Singapore's GDPppp is nothing short of phenomenal. More than 50% greater than that of the USA (see Figure 4). Singapore is unique in that the government leaders and workers are remunerated by a bonus system that is tied to economic performance. The ministerial salary formula is a function of 1) real median income growth rate of Singaporean citizens; 2) real growth rate of the lowest 20th percentile income of Singaporean

citizens; 3) Unemployment rate of Singaporean citizens; and 4) Real GDP growth. The government and private sectors intentionally share national economic performance goals and rewards. This is the highest and broadest level of collaboration known for uniting the efforts of the entire nation. Management theory states that rewards are best related to objectives if high performance outcomes are desired. Many studies attribute Singapore's success to capital accumulation and high skilled labor rather than productivity. These led to a gross underestimation of Singapore by Krugman (1994). But CDR theory shows that it is rule of law that attracts capital and that skill is really human capital, not labor. In chapter 2a we show how collaboration is the factor that permits rule of law. In due course capitalism, democracy and rule of law will produce GDP. So, after all, collaboration may be the root cause for Singapore's GDP success. Maybe all countries should adopt their principle of collaboration. Is there a law that permits GDP incentivized government pay and USA has no such law? Maybe all countries should make such a law. If that is the case, there is a need for a book to share this with the world, to raise CDR and build middle class countries worldwide.

The bitcoin collaboration

One example of a collaboration is the US dollar. The Congressional Coinage Act of 1792 established the United States dollar as the country's standard unit of money. The dollar is fiat currency. Fiat currency because it is a national currency that is not pegged to the price of a commodity such as gold or silver. It is money that is largely based on the public's faith in the currency's issuer, which is the US government central bank. In 2007 Kenya developed the M-Pesa (Swahili for money) mobile money transfer service that bypasses banks. The most recent fiat currency, bitcoin, came into existence in 2009. Bitcoin is a digital cryptocurrency asset that uses cryptography to control its creation and management, rather than relying on a central authority. It is an example of even greater collaboration. It is created by the common man, for use by the common man, independently of any banking institution. Bitcoin Beach, a testing ground in El Salvador is an example of how bitcoin has created a local economy within a world economy of common men. It is the ultimate collaboration in a very important economic activity.

Epigenetic transgenerational sequela

Epigenetic transgenerational sequela refers to heritable changes in gene expression that occur without modifications at the deoxyribonucleic acid (DNA) sequence level. Positive attributes and skills can be passed on to biological offspring. However, formerly oppressed entire communities can suffer a negative epigenetic transgenerational sequela that is a debilitating obstacle to collaboration. People who are hurt, hurt people. This condition must be alleviated if they are to regain their ability to collaborate. Merely talking about this is insufficient and usually ineffective. The upshot is that communities must develop and train collaboration skills, and this not left to chance. This training should begin at an early age. One example might be a requirement that all school children play a team sport. That way they may discover the power of collaboration for themselves not possible through individual sport. The resulting newfound entrepreneurship and wealth will imbue confidence, self-respect and the respect of others that words alone cannot engender. Old grudges will become irrelevant. It may also be worthwhile to study the history of other countries that got over their historic oppression. England was once a colony of Rome. Hongkong, Singapore, New Zealand, Australia, Bermuda, Cayman Islands, and mainland America were colonies of England. Taiwan and South Korea were colonies of Japan. They all got over it to become high collaboration high per capita GDP countries.

Summary findings

The following is a summary of the important findings of this book:
Negative epigenetic transgenerational sequela must be overcome to enable collaboration.
Collaboration skills can be developed by training via team sports and other similar activities.
Cooperation is an obstacle to rule of law.
Collaboration is essential for rule of law.
Cooperation is necessary for ordinary economic growth and development.
Collaboration is necessary for extraordinary economic growth and development.
Collaboration trumps IQ as a predictor of standard of living.
CDR is necessary for economic growth and development.
The CDR economic growth model is global time invariant.
The CDR economic growth model places economics on a sound scientific footing.
20% of people possess 80% of capital... only a rising rich lifts the tide and the poor with it.
Human capital ideas of imagination and creativity represents 85% of total capital.
The theoretical expected value of endogenous economic growth is 1.8%.
The theoretical maximum one-year growth is 30%.
The theoretical economic reinvestment rate is 21%.
The tax rate that maximizes gross domestic product is 21%.
The theoretical expected return on investment is 9.6%.
Natural resources, geography, population, and government spending are negligible.
Wealth is unlimited.

Let's begin

We established that the genesis of economic growth and development and what is salutary thereto is good institutions. Dam (2006) suggests how to implement rule of law and other institutions. Now let us take a ride through collaboration, law and economic history, to determine exactly the mystery of wealth, how wealthy countries got rich, and how to create middle class countries around the world.

About the companion *The Mystery of Wealth- the first complete economic theory of entrepreneurship:*

"Dennis Ridley has written a fascinating study of the ultimate enigma in economics, the mystery of wealth, using the ultimate tool of modern science, information theory."
George Gilder, author of Life After Google, Knowledge & Power, and twenty other books.

"This book is well written. It is a mind changer. It gives a thorough and complete economic theory of entrepreneurship. It comes alive when the theory connects entrepreneurship, capitalism, democracy and rule of law to the industrial revolution. While the findings are contrary to popularly held beliefs, the explanations, demonstrations and proofs are compelling and undeniable. It provides a convincing case that the only source of wealth is entrepreneurship via human ideas of imagination and creativity. Therefore, entrepreneurship education must be redesigned to exploit this understanding. Economics education will change forever."
Randall Holcombe, Ph.D. Economics, Virginia Polytechnic Institute and State University, USA.

"The author has done a nice job of two stage least squares to separate total capital into exogenous human capital and endogenous capital stock of knowledge, recordings and machines, etc. The finding that human capital is 85% just tells how very much capital stock is subject to depreciation and obsolescence. I would not have guessed that natural resources contribute only 6% to GDP. I always thought it contributed much more and was the most important factor in economic development. Similarly, it was surprising but interesting to learn that geography only contributes 4% to GDP."
Aryanne D. de Silva, Ph.D. Psychology, University of Notre Dame, USA.

"Many authors have suggested that capitalism, democracy and rule of law are important for economic growth, but CDR is the first mathematical model to predict approximately 90% of GDP. I was surprised so I obtained the data from the book and tested it myself. The results were astonishingly. Finally, we have a sound scientific economic growth model. The implication is that the conversion of capital to GDP is determined by the laws of natural sciences and is the same in all countries in the world. What is commonly thought to be differences in productivity is actually the differences in the amount of capital that countries can attract for conversion to GDP. It is now clear that the true and only source of wealth is human capital ideas of imagination and creativity and it can only be converted in the presence of catalysts: democracy and rule of law. Poor countries can now focus on these features of society with confidence that life can get better. Noneffective strategies such as government spending can be put to bed. There is no good reason why the implementation of the CDR concept cannot serve to end poverty and build middle class societies all around the world."
Pierre Ngnepieba, Ph.D. Mathematics, University of Grenoble-Alpes, France.

"The author provides a pedagogical suite of proposals for revising entrepreneurship, economics, engineering and mathematics courses. They include sample syllabi designed to better develop science, technology, engineering and mathematics (STEM), and entrepreneurial concepts and creative thinking in higher education. This is the definitive economic theory of entrepreneurship." *John Washington, JD, University of Florida, USA.*

The CDR model quantifies the proposition "Every individual is continually exerting himself to find out the most advantageous employment for whatever capital he can command. It is his own advantage, indeed, and not that of the society that he has in view. But, the study of his own advantage naturally, or rather necessarily, leads him to prefer that employment which is most advantageous to society… He intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention. By pursuing his own interest, he frequently promotes that of the society more effectually than when he really intends to promote it." *Adam Smith, LL.D., University of Glasgow, Scotland. Father of modern economics and capitalism.*