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The conundrum of neoclassical economic theory and quantitative finance induced 2008 financial crisis and the great financial crisis enabled transition from cheap oil based mass-production economy to the emergence of cheap microchip enabled information economy [attention merchants' surveillance capitalism]

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ABSTRACT

The text examines the main insights of the new sciences and disciplines, and shows how they reveal the flaws of NEWTONIAN orthodox NEOCLASSICAL ECONOMIC THEORY, in explaining and predicting the catastrophic events of the near economic history of the Unites States, and provides new ways of understanding the role of monetary policy in the emergence of information economy of ASSET MANAGER CAPITALISM. A brief history of the transition from MANAGERIAL CAPITALISM of nation states of the post-World War II institutionalized with the BRETTON WOODS AGREEMENT, to global ASSET MANAGER CAPITALISM, is presented to enlighten the emergence of CHIMERICA [China+America], and President Trump's recent attempts to dismember it by enabling the emergence of a bipolar world - TECHNOLOGIC COLD WAR - by weaponized global interdependence. The globally interdependent techno-sphere is shown as an enabled outcome of the implementation of WASHINGTON CONCENSUS of Anglo-American ASSET MANAGER CAPITALISM, that survived a comatose near death experience in 2007-2008. The major warriors and battlegrounds of THE TECHNOLOGIC COLD WAR are identified.

The text shows how GAIA THEORY sheds new light on economic growth, how fuzzy logic affects the national accounts, how accounting systems over-value the assets of publicly traded multinational companies balance sheets, and how network theory reveals the value of relationships, and argues that the economy needs to be viewed as a complex, chaotic system, as scientists view nature, not as an equilibrium seeking NEWTONIAN construct.

1. Introduction

In the self-regulating banking system, put in place with GRAMM-LEACH-BLILEY FINACIAL SERVICES MODERNIZATION ACT that with PRESIDENT CLINTON's signature in 1999 repealed GLASS-STEAGALL BANKING ACT OF 1933 with FED's CHAIRMAN, ALAN GREESPAN's enthusiastic lobbying, 97% of money that were in the hands of the public consisted of bank deposits, and in the absence of a state-issued debt-free money, money needed for an economy to function, had be borrowed from the banking sector, and hence the lender of last resort, THE CENTRAL BANK.

After the implosion of NASDAQ's dot.com BUBBLE in March 2000 that the GREENSPAN PUT was instrumental in inflating, GREENSPAN kept the benchmark price for money at 1% for too long at the beginning of 21st century, and thus enabled the residential real estate bubbles in the United States and in different scales in various parts of the world, and in 2007 the real estate bubble collapsed in the United States ushering in a full blown global financial crisis in 2008, and that led to massive bailouts of the global financial system by their central banks and their governments.

During the 19 years [1987-2006] ALAN GREENSPAN was at the helm of monetary policy, at every opportunity he had to address the law-makers at the CAPITOL HILL, he lectured them on how unimpeded competitive markets deliver optimal welfare, and that the financial institutions which create money, and through which money is allocated, have no independent effect on the real equilibrium of the economy, but are only acting on behalf of well-informed sovereign consumers. And most of the law-makers, from the ways they voted, seemed to have bought in GREENSPAN'S storyline.

During GREENSPAN's reign, the forecasting models of the TREASURY and the FED lacked a financial sector. The assumption that future prices would move in line with current expectations removed any need to take precautions against financial collapse, despite a continuous history of financial manias and panics. Aiming to minimize regulation, DYNAMIC STOCASTIC GENERAL EQUILIBRIUM models of the economy ignored the financial sector.

GREENSPAN with the enthusiastic lobbying of LAWRENCE SUMMERS, ROBERT RUBIN and ARTHUR LEVITT was able to convince the law-makers to liberate finance from regulations and down-size whatever regulators were left, and within a decade liberated finance span out of control, and imploded. But few months before the 2007-2008 implosion, DICK CHANEY's and GEORGE W. BUSH's WHITE HOUSE, with impeccable prophesy, put a very competent economic historian schooled in Milton Friedman's and Anna J. Swartz's A MONETARY HISTORY OF THE UNITED STATES SINCE 1867-1960 (Friedman Swartz, 1971), a play book for central banks on how to manage financial crisis, showing the central bank's management of the 1929 implosion as the wrong play-book, in charge of FED, BEN BERNANKE.

The 2007-2008 FINANCIAL CRISIS started with some homeowners having bought homes they could not afford found it hard to make their monthly mortgage payments in some locations in the United States, and graduated into a first run on a British bank, NORTHERN ROCK, in 150 years. This inherent market instability was compounded by the financial regulators' failure to understand the built-in dynamics of banking networks. Before the crash, those regulators with ALAN GREENSPAN's assurances worked on the assumption that networks always serve to disperse risk, and so the

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regulations that they devised only monitored the nodes in the networks - individual banks - rather than overseeing the nature of their interconnections.

But the crash made clear that a network's structure can be robust-yet-fragile, as Nassim Nicholas Taleb explained in ANTIFRAGILE: THINGS THAT GAIN FROM DISORDER (Taleb, 2018). Network structure usually behaves as a robust shock-absorber, but then its positive feedback - as the character of the network evolves – switches it to become a fragile shock-amplifier. And, that caused 5 pillars of American finance to vanish in 2008. GREENSPAN's predecessor, BEN BERNANKE's first step was to lower the interest rate and lengthen the term on direct loans to banks from the FED's DISCOUNT WINDOW. As commercial banks were slow to respond, and as the liquidity situation worsened, FED announced the creation of TERM AUCTION FACILITY to make loans at its discount window cheaper and anonymous.

Institutions that posed systemic threats included not only commercial banks but also, if not primarily, investment banks as well as mortgage and insurance groups. They were desperately short of capital. Investment banks' funding base has been most volatile without access to retail deposits last two decades before 2008. Their assets tended to be very risky while engaging in huge volume of transactions among themselves, with hedge funds, and with commercial banks. In 1980 financial sector debt was only 10% of non-financial debt. In 2008 it stood at 50%, turning investment banks into machines that trade heavily with each other and reported handsome profits that justified the bankers' astronomical bonuses, bankers kept.

Leverage ratios in the banking industry competed with those of hedge funds. Neither were governments themselves, and for that matter the national economy, free of leverage. Summing up federal, state, local government, company and household liabilities: for every productive $1 there were $3.7 debt in 2008. Emergency lending was made to banks, and currency swap agreements were drawn up with 14 different countries in order to ensure that they had access to the dollars they needed.

The most important outcome, however, was that key interest rates across the world dropped precipitously. US FED FUNDS TARGET RATE went from 5.25% in August 2007 down to 0.25% target by December 2008. Likewise Bank of England dropped its primary interest rate from 5.0% in October 2008 to 0.5% by March 2009. October 2008 saw the crisis intensify, which led to an internationally coordinated interest rate cut by 6 major central banks.

By 2016 monetary policy makers had dropped interest rates 637 times. As this continued through the post crisis period and established a low interest rate environment for the global economy, a key enabling condition for parts of today's digital economy began to arise. But at a price. The bailouts required governments around the world to rescue major global banks whose net worth had turned out to be fictitious; with the bailouts continuing to impose heavy social costs ten years on with imploded public debts, squeezed public budgets, heavy household debt and negative returns for savers.

Over the period 2008-2014 in the United States, the FEDERAL RESERVE embarked on three different QUANTITATIVE EASING schemes, totaling $4.5trillion. In the UK, the BANK OF ENGLAND undertook 375billion pounds of QE between 2009 and 2012, and in Europe, the ECB committed 60billion euros per month from January 2015 to March 2017. By the end of 2016, central banks across the world had purchased more than $12.3trillion worth of worthless 'assets'. The primary argument for using quantitative easing was that it should lower the yields of other assets. If traditional monetary policy operates primarily by altering the short-term interest rate, quantitative easing is expected to affect the longer interest rates and the yields of alternative assets.

Granted that the assets are not perfect substitutes for one another, taking away or restricting supply of one asset should have some effect on demand for other assets. In particular, reducing the yield of US government bonds should increase the demand for other financial assets and raise the prices of stocks and subsequently create stockholder wealth, provided that the biggest holders of US government debt, IMF mandated 'independent' central banks of the world, do not sell, better yet are not allowed to sell. While the evidence is still not definitive, it does seem that quantitative easing has had an effect. Corporate bond yields have declined and stock markets have surged upwards until September 2018. That may have had an effect on all sectors of the US economy as well by making much of the economic recovery depend on $4.7trillion of new corporate debt since 2007.

FED announced its plans in September 2017 for a gradual unwinding of its $4.5trillion balance sheet that swelled during the previous decade as it engaged in QUANTITATIVE EASING to ease the pernicious effects of the global financial crisis. The plan was to set a path and proceed on autopilot. This it was hoped, would avoid the pace of unwinding being taken as a signal of the direction of interest rates. It would start slowly, just $10 billion a month from October 2017, and smoothly pick up pace. By October 2018 it had quickened, as planned, to $50billion. That coincided with the start of a bout of market turbulence. The S&P 500 INDEX of leading shares fell by 14% in the final 3 months of 2018.

BERNANKE's FED's expansion of balance sheet, in 2008, was announced to provide banks with liquidity they desperately needed; to signal to markets that monetary policy would remain loose for some considerable time, and to reduce the bond yields, encouraging investors to buy riskier assets.

Recently, in addition to loose monetary policy, there has been a significant growth in corporate cash hoarding in tax havens. In the United States, as of January 2016, $1.9trillion was held by companies in cash and cash like assets mostly in tax havens. In the wake of the crisis, offshore wealth grew by 25% between 2008 and 2014, which resulted in an estimated $7.6trillion of household financial wealth being held in tax havens. APPLE, FACEBOOK, AMAZON, and UBER seem to be the leaders of tax evasion schemes that give them use of the cash saved from the tax collector for mergers and acquisitions, that mostly centralizes existing capacity rather than building new.

Tax evasion, austerity, and extraordinary monetary policies were all mutually reinforcing. The outcomes of bailouts a decade later seem as losses of bad financial bets got nationalized, and profits of good bets got privatized, causing the public debt of rich economies to implode. Risks got socialized and rewards privatized as the global economy had begun a long-term transition from a mass-production economy based on cheap oil to an information economy based on cheap microchips.

Microchips are ubiquitous, embedded into most manufactured products from toasters and to ballistic missiles. WORLD SEMICONDUCTOR TRADE STATISTICS, a data provider, recons that the market for chips was worth $421billion in 2017, a rise of 1.6% on previous year (The Economist, 2018). If anything, these raw numbers understate the importance of chip-making. The global e-commerce is reckoned to have revenues over $2trillion a year, for example. If data are the new oil, microchips are the internal-combustion engines that turn them into something useful. The ubiquity of chips has led to the growth of a vast global industry when globalization was the center core of WASHINGTON CONSENSUS. Microchips have billions of components and are made in ultra-modern factories that required tens of billions of dollars of investment to build. Indeed, that such devices can be built at all is a living testament to global specialization and trade that was put in place with American leadership in the last two decades of the 20th century. These hugely complicated products have spawned an equally complex global know-how interdependence and supply chain involving thousands of specialized companies all around the world.

But in the age of "Making America Great Again", and "made in China" target dates, both China and the United States see the semiconductor technology as crucial to their future. For America, its lead in chip-making is a strategic asset. PENTAGON's guiding hand was instrumental in the development of the earlier uses of chips produced by Silicon Valley for the guidance systems of nuclear missiles. In 2014, China established the NATIONAL INTEGRATED CIRCUIT INDUSTRY INVESTMENT FUND to domestically supply its needs. In 2014, China's domestic supply capability was less than a third. The NATIONAL INTEGRATED INDUSTRY INVESTMENT FUND was set up to finance research and development for integrated circuit industry, and is planned to grow from $65billion in 2014 to $305billion by 2030 to supply its needs domestically and reduce China's dependence on foreign suppliers. It seems, President Trump has not welcomed China's plans.

A manifestation of the uneasiness of uncomfortable interdependence of CHIMERICA as summarized by Stephen Roach in UNBALANCED: THE CODEPENDENCE OF AMERICA AND CHINA (Roach, 2014) is their technological competition in chip-making at a historical moment in 2019. For 50 years, progress in chip-making has been summarized by MOORE'S LAW, which state that the number of components that can be crammed onto a chip doubles every two years and thus, roughly, so does its computing power. But the law is breaking down, losing its predictive capability, and leaving the future of the industry looking fuzzy and less certain than at any time in the past.

With a long decline in manufacturing profitability partly due to the income distribution system of MANAGERIAL CAPITALISM that the victors of WWII put in place in the rich economies, and partly due to the global overcapacity developed as the emerging economies of the world tried to catch up with the rich west, Anglo-American neoliberals have turned to globalize finance and data as one way to maintain economic growth and vitality in the face of sluggish manufacturing sector of the rich west giving birth to ASSET

MANAGER CAPITALISM.

All economic doctrines, but the anarchists, presuppose the existence of some kind of state, even minimal 'night-watchman-state'. The main flaw of the globalization efforts of ASSET MANAGER CAPITALISM in the last two decades of the 20th century was the attempts to integrate markets, particularly financial markets, on a global scale without a state. And that has rendered life in the globalized markets more insecure, more criminal and less legitimate. It was the globally stateless deregulated global financial system that collapsed in 2008, ironically to be saved by central banks and their governments that the global financial system had down-sized and stripped their regulatory powers.

In the 21st century, enabled by developments in digital technologies, data have become increasingly central to firms in reorganizing their relations with their employees, customers, and competitors. The platform has emerged as a new business model capable of extracting and controlling immense amounts of data, and with this new business model monopolists of data emerged. At the most general level, platforms are digital infrastructures that enable two or more groups to interact. Rather than having to build a marketplace from the ground up, a platform provides the basic infrastructure to mediate between different groups. This is platforms' key advantage over traditional business models when it comes to data. Since a platform positions itself between users, as the ground upon which their activities occur, giving the platform a privileged access to record and own them.

Furthermore, digital platforms produce and are reliant on 'network effects', more users begetting more users developing an innate tendency to monopolize. Moreover, the ability to rapidly scale many platform businesses by relying on pre-existing infrastructure and low marginal costs with few limits to growth promotes monopolization. The rules of product and service development, as well as marketplace interactions are set by the platform owners. In their position as an intermediary, platforms gain not only access to more data but also control and governance over the rules of the game. Far from being mere owners of data, these companies are becoming owners of the infrastructures of society. Hence the monopolistic DNA of these platforms must be taken into account in any analysis of their effect on the broader economy. Neoclassical model to explain and predict the platform world in the making is distortional.

Since platforms are grounded upon the extraction of data and the generation of network effects, the following are some strategic options that seem to have emerged from the competitive dynamics of these large platforms. The Cross-subsidization Strategy: Their expansion of data extraction drives cross-subsidization of services and cross-subsidization is used by the platforms to draw users into their network. The Gatekeeper Strategy: The platforms position themselves as a gatekeeper to occupy key positions within the ecosystem around a core business neither by horizontal nor vertical nor conglomerate mergers. They are more like rhizoidal connections driven by permanent effort to place themselves in key platform positions. The Convergence of Market Strategy: The platforms work for convergence of markets. The convergence thesis is the tendency for different platform companies to become increasingly similar as they encroach upon the same market and data areas. The Siloed Platform Strategy: Enclosure of ecosystems funneling of data extraction into siloed platforms. Their strategic choices are being installed in our economic systems.

With the advent of ASSET MANAGER CAPITALISM, US monetary policy was set since 1987 under Maestro GREENSPAN's baton with low interest rates and ample credit fine-tuned to generate higher asset prices when the equity markets took a down-turn and create wealth effect to spark broader economic growth by making rich richer as chronicled by Bob Woodward's hagiography MAESTRO: GREEENSPAN'S FED AND THE AMERICAN BOOM (Woodward, 2000). The maestro fell short of achieving broader economic growth but was spot-on in creating the stock market bubble for dot.com startups followed it by delivering a residential real estate bubble after NASDAQ's crash and passed the baton to BEN BERNANKE in 2006 for the finale. The new maestro was one of the prominent disciples of MILTON FRIEDMAN's interpretation of 1929 FINANCIAL CRISIS, perhaps, the most apprenticed in FRIEDMAN's historical causes of 1929 GREAT DEPRESSION in his generation for the finale: the 2007-2008 GLOBAL FINANCIAL CRISIS. The new maestro was not going to repeat FED's mishandling of 1929 as he promised to Milton Friedman on Friedman's birthday celebration.

Yet, the real the real US GDP between 1975 and 2017 roughly tripled, from $5.9trillion to $17.19trillion. During this period, productivity grew by about 60%. But from 1979 onwards, real hourly wages for the great majority of American employees have stagnated or even fallen. In other words, for almost 4 decades a tiny elite has captured nearly all the gains from certainly in the capitalist history not only in the United States but at differing rates in the world, took place and 6+ billion people watched 'eyes wide shut'.

According to 2017 OXFAM REPORT: AN ECONOMY FOR THE 99% (Vaoufakis et al., 2008), 62 men in 2016 owned the same amount of wealth as the poorest half of the world's population. The wealth of the 62 very richest individuals increased by 45% between 2010 and 2015, a jump more than half a trillion dollars in total. Over the same period, the wealth of the bottom half fell by just over a trillion dollars, a drop of 38%. In 2018, the world's top 26 billionaires owned as much as the poorest 3.8billion according to OXFAM, as the billionaires increased their fortunes by $2.5 billion per day, while the poorest half of humanity saw their wealth dwindle by 11% billionaires' riches increased by 12%. In 2018 the top 26 wealthiest people owned $1.4trillion, or as much as the 3.8billion poorest people. In 2017, it was the top 43 people. The mega wealthy have also become more concentrated.

Few weeks before the 2018 DAVOS WORLD ECONOMIC FORUM of select plutocrats who advocate markets' efficiency over governments' and globalism's superiority over nationalism, and some mega asset managers, BLOOMBERG announced that China produced 2 US $billionaires a week, about 100, in 2017, and updated the 2017 announcement to a US $billionaire every other day for 2018, about 180, few weeks before the 2019 DAVOS meeting. For more than 100 years, neoclassical economics ignored PARETO's explanation of the dynamics of wealth distribution, but embraced PARETO EFFICIENCY and OPTIMALITY.

The mainstream economic theory was neither able to offer convincing explanations of what, how, and why, nor was it able to predict these booms and busts, but the risk models of quantitative finance provided a mathematical cover-up helping many to watch the greatest transfer of wealth 'eyes wide open shut' as the digitally connected global financial network with capability to move money at the speed of light with its elite intact and firmer in charge was reorganized.

The last two decades of the 20th century witnessed the apparently boundless co-dependent rise of two forces: the information revolution and financial markets. The 21st century was inaugurated with FED's ALAN GREENSPAN's fear mongering of possibility of global computers' crashing, and with claims about the advent of a "new economy" characterized by the flourishing of IT and financial markets capable of relentless growth. Global computers did not crash but the possibility gave Greenspan to cut interest rates and flood the markets with easy credit to unsuccessfully prolong the dot.com bubble. It burst three months later. 8 years later, the 2008 FINANCIAL CRISIS spoiled the hyped bright expectations for 6+trillion residents of planet Earth.

The 2008 economic crisis, a demon of our own design, was also a crisis for orthodox neoclassical economic theory, the theory of its design. If the origins of the crisis are thoroughly human, so must be its solutions. A decade of trauma has had a chastening effect among some peddlers of neoclassical economic theories. They started thinking old ideas, asking new questions, and occasionally welcoming heretics back into the fold. Some believed that what failed was not just a financial system, and a way of regulating that financial system, but a set of economic theories, and that we need to reject simplicities of neoclassical economics, reject overly mathematical economics, and revisit the insights of the past and try to do good science by learning how good science is done from disciplines that succeeded.

Before 1980 many people believed that the market was something that has always existed in a quasi-natural state, much like gravity. It seemed to enjoy a material omnipresence, sharing many characteristics of the forces of nature, warranting a science of its own. The science was first called 'political economy' and then, after roughly 1870, 'economics'. The modern orthodoxy of that science, the neoclassical tradition, has always taken the nature of the market as the central province of economics. In fact, an overview of the history of the first century of neoclassical economics would confirm that its adherents had been much more fascinated with the status and nature of agents than with the structure and composition of markets.

Most of the time, the concept of the market was offhandedly treated as a synonym for the phenomenon of exchange itself. Even, in the few instances when major thinkers in the tradition felt they should discuss the actual sequence of bids and asks in their models of trade - LEON WALRAS with his TATONNEMENT or FRANCIS EDGEWORT with his RE-CONTRACTING PROCESS what becomes apparent is that they bore little relationship to the operation of any actual contemporary market. Mid-20th century attempts to develop accounts of price dynamics were, if anything, even further removed from the increasingly sophisticated diversity of market formats and structures, as well as the actual sequence of tasks that markets accomplish. The market in neoclassical economics came to be modeled as a

relatively homogeneous and undifferentiated entity.

Yanis Varoufakis, Joseph Halevi and Nicholas J. Theocarakis in MODERN POLITICAL ECONOMICS: MAKING SENSE OF THE POST-2008 WORLD[1] delve into major economic theories and map out the trajectories that MANAGERIAL CAPITALISM of the NEW DEAL embedded in BRETTON WOODS AGREEMENT's almost centrally coordinated stability's designed disintegration in the 1970s, and then to an intentional magnification of unsustainable imbalances of the 1980s delivered ASSET MANAGER CAPITALISM that globally privatized money creation during the 1990s and beyond to September 15, 2008. The authors' main finding is that any system of ideas whose purpose is to describe capitalism in mathematical or engineering terms lead to inevitable logical inconsistency. The only scientific truth about capitalism is its radical indeterminacy. NEWTONIAN science based economics is an illusion leading one closer to astrology than to astronomy and more akin to a mathematized religion than to mathematical physics.

The economic ideas have always been linked to politics, paradigm shifts in economic theory have been intertwined with configurations of the political landscape. ADAM SMITH's ideas helped inspire dramatic expansion in free trade in the 19th century. KARL MARX's theories provided the impetus for cataclysmic changes in the 20th century. The neoclassical paradigm laid the intellectual foundations of FINANCIAL CAPITALISM, as JOHN MAYNARD KEYNES's solutions to the GREAT DEPRESSION tempered FINANCIAL CAPITALISM with the directorial role for the state and developed the foundations of MANGERIAL CAPITALISM. It was in this period that the idea of the state as a benevolent guardian of the public interest gained currency.

In the period after World War II, state activism of MANAGERIAL CAPITALISM grew to new heights, until Ronald Reagan and Margaret Thatcher ushered in ASSET MANAGER CATIPALISM in the 1980s after falling under the spell of Milton Friedman's and Friedrich Hayek's versions of neoclassical paradigm explains Daniel Stedman Jones in MASTERS OF THE UNIVERSE: HAYEK, FRIEDMAN, AND THE BIRTH OF NEOLIBERAL POLITICS (Jones, 2008). The KEYNESIAN regime ran into trouble in the STAGFLATIONARY 1970s and was superseded by MONETARISM, which was in fact a reversion to PRE-KEYNESIAN orthodoxy about both money and governments.

During the last 40 years the balance of power has shifted decisively from labor to capital; from working class to the business class; and from the old business elites to new financial elites, the ASSET MANAGERS. The homage, NEW CONSENSUS – mixture of 'new' CLASSICAL and 'new' KEYNESIAN economics - pays to power helped to render the power shift invisible.

Whether we consider the quantitative policies taken by Sweden's central bank in the 1980s and 1990s, or the policies of the central banks in the United States, Asian Countries, or Japan, the historic fact is that central banks have been at the center of the boom-and-bust cycles that have plagued the world economy as they increased their independence and decreased their accountability. The independent central banks were instrumental in delivering the shift of power from working class to business class, from the old business elites to new financial elites, the ASSET MANAGERS.

At the onset of the GREAT RECESSION, as house prices sank, and joblessness soared, many commentators concluded that the economic convictions behind the disaster would now be consigned to history. Instead a political class started to blame the government interventions for the disaster and demanded global drive for austerity, stagflation and an international sovereign debt crisis. Philip Mirowski in NEVER LET A SERIOUS CRISIS GO TO WASTE: HOW NEOLIBERALISM SURVIVED THE FINANCIAL MELTDOWN (Mirowski, 2013) finds an apt comparison in this situation in classic studies of cognitive dissonance. He concludes that neoliberal thought has become so pervasive that any countervailing evidence only serves to further convince disciples of its ultimate truth. Once neoliberalism became a THEORY OF EVERYTHING providing a revolutionary account of self, knowledge, information, markets, and government, it could no longer be falsified by anything as mundane as data from the 'real' economy. After financial apocalypse, neoliberalism rose from the dead observes Philip Mirowski.

2. The birth of attention merchants' surveillance capitalism

Fundamental shifts in human affairs come mostly in two guises, as low probability events that could in an instant "change everything", and as persistent, gradually unfolding trends that have no less far-reaching impacts in the long term. Fundamental changes come both as unpredictable discontinuities and as gradually unfolding trends as NIKOLAI KONDRATIEFF argued and paid with his life in MARXIST-LENINIST RUSSIA in the first quarter of the 20th century. The gradually unfolding events deserves at least a brief acknowledgement. They are epoch making technical developments: incremental engineering progress, improvements in efficiency and reliability, reduction of unit costs, and gradual diffusion of new techniques, usually following fairly predictable logistic curves are very much in evidence, but they are punctuated by surprising, sometimes stunning discontinuities.

Economics, having taken its cue from ISAAC NEWTON's physics, is an equilibrium system, disturbances are to be short and self-correcting. It is centered on equilibrium: an economy's natural resting state. Solving a set of equations that describes a market, conceived of as populated by predictably self-interested individuals who face various constraints, yields that equilibrium, the prices that balance supply and demand. Physicists have over the centuries used mathematics to understand the nature of gravity, light, electricity, magnetism and nuclear forces. Analytic solutions were achieved when their equations were linear, the noise GAUSSIAN, and the variables separable. Our world was written by them in the passive voice: rivers flow, rocks fall, planets orbit. There are no doings. Only happenings.

And yet, we are in a world of living creatures that construct themselves. What neoclassical economic theory misses is the idea of a system that constructs itself. The rhythmic character of economic life, the waves of innovation and destruction, the rise and fall of systems of political economy do not abide well with the conditions neoclassical economic theory portray, because network equations turn out to be nonlinear, noise associated with them non-GAUSSIAN, and variables non-separable. They do not have explicit solutions.

Some post-2008 FINANCIAL CRISIS economists draw on strands of the discipline less enamored of equilibrium. JOAN ROBINSON worried that equilibrium models understated the role of history in determining outcomes. JOSEPH SCHUMPETER saw the economy as undergoing constant change powered by innovation. FRIEDRICH HAYEK wrote on how the separate actions of individuals could generate 'spontaneous order' of incomprehensible complexity.

A famous economic theory of cycles is the KONDRATIEFF CYCLE, a long wave of 40 or 50 years, which starts with a cluster of new technologies and exhausts itself when they have been used up. SCHUMPETER drew on this idea in his depiction of capitalism's cycles of creation and destruction. In SCHUMPETERIAN view, capitalism is a dynamic disequilibrium system. The new only rarely supplements the old; it usually destroys it. The old, however, does not, as it were, simply give up but rather tries to forestall death or co-opt its usurper – a la KRONOS – with important implications.

There is neither a unique full employment equilibrium nor the variety of equilibria posited by KEYNES. Nevertheless, there is a potential meeting between KEYNES and SCHUMPETER, since SCHUMPETER, like the earlier generation of REAL BUSINESSS CYCLE THEORISTS, would not have denied that stabilization policy could make rocking less violent. Within the long cycles are shorter cycles of boom and bust, lasting 8 to 10 years. Lacking proper scientific explanation Paul Samuelson called cycle theories SCIENCE FICTION, nevertheless cycles have had great influence on macroeconomic policy. Typical macroeconomic constructions, such as the CYCLICALLY ADJUSTED BUDGET DEFICIT, refer to short cycles of definite duration, which oscillate round some 'normal' or 'long-run' situation.

DAVID HUME, in the tradition of British Empiricism, thought of a passive observing mind/brain in a vat and wondered how that observing mind could have reliable knowledge of the world. He rightly noted that from what is observed to be the case, one cannot deduce what ought to be the case. One cannot deduce an ought from an is. Yet, ever since DAVID HUME, economists have distinguished between short-run and the long-run effects of economic change, including the effects of policy interventions. The distinction has served to protect the theory of equilibrium, by enabling it to be stated in a form which took some account of reality.

In economics, the short-run now typically stands for the period during which a market or an economy of markets temporarily deviates from its long-term equilibrium position under the impact of some 'shock'; like a pendulum temporarily dislodged from a position of rest. This way of thinking suggests that governments should leave it to markets to discover their natural long-run equilibrium positions.

Reminding us of the harsh reality that in the long-run we will all be dead, JOHN MARNARD KEYNES pointed out that the long-run may be too long to be relevant. Historical cycles, on the other hand, refer to disturbances of a moral, socio-political, rather than technological equilibrium. That is; they embed technological innovation within the wider frame of political and social change. Societies are said to swing like pendulums between alternative phases of vigor and decay, progress and reaction, prodigality and puritanism. Each expansive movement produces a crisis of excess that leads to a reaction. The equilibrium position is hard to achieve and is always unstable.

By far the most important concatenation of these fundamental advances took place between 1867 and 1914, when electricity generation, steam and water turbines, internal combustion engines, inexpensive steel, aluminum, explosives, synthetic fertilizers, and electronic components created the technical foundations of the 20th century. A second remarkable saltation took place during the 1930s and 1940s with the introduction of gas turbines, nuclear fission, electronic computing, semiconductors, key plastics, insecticides, and herbicides. The history of jet flight is a good illustration of the inherently unpredictable nature of these rapid technical shifts.

Before the scientific revolution of the 17th century, there was no suggestion that there might be simple, orderly laws underpinning the confusion of the world, and the nearest anyone came offering a reason for the behavior of wind, and weather, the occurrence of famines, or the orbits of planets was that they resulted from the whim of God, or gods. NEWTON made the Universe seem an orderly place, with no room for interference from capricious gods. He provided laws of motion, which describe the behavior of moving objects in the laboratory, or in the world at large, or in the SOLAR SYSTEM and beyond, and which, by extension, must also be thought of as universal laws, applying everywhere and at all times.

The kinetic theory of gasses was a significant example of how the universal laws of physics brought order out of chaos. The term "gas" was coined by JAN VAN HELMONT from the Greek word for chaos. It was ISAAC NEWTON's fellows' world-view that unleashed a theory of progress with human creativity and free will at its core.

ISAAC NEWTON worked out the mathematical basis of physics, RENE DESCARTES, its dualist philosophy, and FRANCIS BACON's the experimental method that subsequently led science to reach its heights. The experimental method that delivered CERTAIN results in physics came to be called REDUCTIONISM. REDUCTIONISM assumes that matter is the basis of all existence and that material world is composed of a multitude of separate objects assembled into a huge structure. Consequently, complex phenomena can be understood by reducing them to their basic building blocks, and by looking for the mechanisms through which these building blocks interact. Although physics led the way, the reductionist methodology eventually permeated all the sciences.

With the triumphs of DESCARTES, NEWTON, and LAPLACE, we have come to regard physics as the answer to our questions about what reality "is". In that search, we have come to think of the world as a vast "machine". This fundamental framework, extended by SPECIAL AND GENERAL RELATIVITY, QUANTUM MECHANICS, and QUANTUM FIELD THEORY alter some of the basic deterministic aspects of NEWTONIAN physics but not the view of reality as a giant "machine". Evolving life is not a "machine", neither is its biosphere. Unlike physics where laws hold sway, no laws at all entail the becoming of the biosphere.

We do not know what shall become as the biosphere evolves and shapes its own future in ways we cannot state in advance. This lawless emergence is contingent yet not random. Biosphere constructs itself and does so into a biosphere of increasing diversity. The living world can become more diverse and complex and in an ongoing way creates its own potential to do so. That requires harnessing of the release of energy to build order faster than that order can be dissipated by the second law of thermodynamics.

Much of the scientific method relied on taking a reductive stance toward nature, breaking the complex into simple basic units. In physics, this meant seeing objects as aggregates of individual atoms. In human affairs, it meant building a notion of society based on an understanding of the individual. THOMAS HOBBES, thus began his political treatise with the individual, a radical and strikingly modern step. According to the Christian doctrine dominating HOBBES's day, societies were organic wholes with individuals as part of the body of CHRIST. Individuals ultimately derived their identity from that larger collective vision. Each part had no shape except by relation to the social whole.

HOBBES reversed all that, putting the individual before society and seeing society as nothing more than aggregate of individuals. HOBBES's individuals were self-interested and social. Just as the atoms of the physics of his day were constantly in in motion, so too were HOBBES's individuals propelled by internal drives that kept them in constant motion. The inevitable result was conflict. Leading in his vision of "war of all against all". Sigmund Freud in CIVILIZATION AND ITS DISCONTENTS[1] argued that civilization stems from primordial guilt that first arose with patricide, perhaps as a band of sons rose up to kill their father. FREUD speculated that in the aftermath of that bloody act, feelings of shame so overwhelmed them that they formed laws and social institutions to prohibit such acts. FREUD thus located our civilizing tendency in guilt, an emotional impulse. In contrast, HOBBES believed humans were rational calculators of self-interest, and for HOBBES rationality ultimately saves humans from themselves. Reason moves HOBBES's individuals, driven by the selfish desire for self-preservation, to relinquish liberty for security, ceding absolute control to a sovereign, a LEVIATHAN, in exchange for security.

The basis of life together is this social contract, in which the state exists only to safeguard the individual's self-preservation. JOHN LOCKE retained HOBBES's ideas of social contract as the glue of society, but attacked HOBBES's vision of absolute monarchy, arguing that it simply transferred the war of all against all to one between the monarch and his subjects. LOCKE thus argued for a limited, constitutional government, which in essence the modern limited, liberal state. Whereas HOBBES believed that only absolute rule could curb self-interest, ADAM SMITH saw self-interest as the basis or social order. The invisible hand of the marketplace thus replaced the sovereign LEVIATHAN, and common interest simply flowed out of collective pursuit of self-interest. So was SMITH's fantasy.

In TURNING POINT: SCIENCE, SOCIETY, AND THE RISING CULTURE (Capra, 1983), Fritiof Capra contends that the NEWTONIAN view of scientific method has crashed and that the first discipline to crash has been physics itself, where CARTESIAN philosophical foundation and the reductionist methodology had seemed most secure. First, quantum theory played havoc with DESCARTES's CERTAINTY PRINCIPLE, and the second discovery pertaining to the nonlocal connections of individual events abolished DESCARTES's separation of mind from matter.

In this 18th century system of the world, NEWTON brought together two themes. Embodied in his calculus and physics, one Newtonian revelation rendered the physical world predictable and measureable. Craving the authority of science, economists then mimicked Newton's laws of motion in their theories, describing the economy as if it were a stable, mechanical system. In the late 19th century, a handful of mathematically minded economists set out to make economics a science as reputable as physics, turned to differential calculus to describe the economy with a set of axioms and equations.

Just as Newton had uncovered the physical laws of motion that explained the world from the scale of a single atom to the movement of the planets, the mathematically minded economists sought to uncover the economic laws of motion that explained the market, starting with a single representative consumer and scaling up to national output. Thus, 150 years of economic theory biased our understanding with static mechanistic models and metaphors, when the economy is better understood as a complex adaptive system, made up of interdependent humans in a dynamic living world. The individual is not only embedded within a system but is directly involved in that system's self-organization. Long before DARWIN, IMMANUEL KANT understood this. "An organized being then, has the property that the parts exist for by means of the whole." KANTIAN WHOLE. Another, less celebrated, was NEWTON's key role in establishing the trustworthy GOLD STANDARD, which made economic valuations as calculable and reliable as the physical dimensions of items in trade. For 200 years after 1717, except for its suspension in the Napoleonic wars, Newton, as master to the Royal Mint, having fixed the value of the pound to gold, the sterling pound, based on chemical irreversibility of gold, became the stable and reliable monetary Polaris. Newton's attempted and failed alchemical endeavors to reverse-engineer gold so that it could be made from base metals such as lead and mercury yielded crucial knowledge for his defense of the gold based pound. Newton's regime rendered money essentially as irreversible as gold, as irreversible as time itself as measurement of economic transactions.

These two concatenations substituted continuous processes for discrete production and gave us the classic image of wheels of industry, rolls of paper, spools of thread, ribbons of steel, classic assembly line of films like CHARLIE CHAPLIN's MODERN TIMES. Such industries represented only part of even industrial nations' output, but the ideal of the continuous process inspired capitalists and socialists alike. In the centuries of continuous process technology, it was manufacturers, refiners, and distributors who seemed to have excessive power over information, now a few disruptive platform companies do. Mass production economy based on cheap fossil fuel is evolving into information economy based on cheap micro-electronics in the 21st century. Industrial civilization flourished at the expense of nature and now threatens the ecology of the living Planet Earth.

In A WORLD BEYOND PHYSICS: THE EMERGENCE & EVOLUTION OF LIFE (Kauffman, 2019), Stuart A. Kauffman sums the economy to be a network of complements and substitutes that he calls the ECONOMIC WEB. Like the biosphere, ECOMONIC WEB's evolution cannot substantially pre-tested, and is "context dependent". And creates its own growing "context" that subtends its "adjacent possible". The adjacent possible is what can arise next in this evolution. This evolution is sucked into the very adjacent possible opportunities it itself creates.

The 80-year history of Information technology is an example. In the 1930s, TURING invented the TURING MACHINE, an abstract formulation of a digital computer. By mid-World War II, TURING's idea was crafted at the University of Pennsylvania into ENIAC machine to calculate the trajectories of naval shells. After the war, VON NEUMANN invented the mainframe computer; and shortly later, IBM made the first commercial machines, expecting to sell only a few. But the mainframe sold widely, and with the invention of the microchip, paved the way for the personal computer.

Chip-making was an in-house affair at the onset of the industry until 1961 when FAIRCHILD SEMICONDUCTOR began assembling and testing products in Hong Kong mostly to arbitrage labor costs. Internationalization of the production processes has accelerated as microchips have become more complicated and more manufacturing processes have been outsourced to specialized firms that emerged in Asia. The result was a multi-national complex constellation of thousands of companies that The ECONOMIST (The Economist 2018) roughly lumped into three categories. Designing [APPLE, INTEL, HUAWEI, QUALCOMM]; Manufacturing [INTEL, SAMSUNG, MICRON, TSMC] Packaging/Assembly [AMCOR, JCET, ASE, KING YUAN]. Designing is supplied by ARM, XILINX, SYNOPSYS, ZUKEN. Manufacturing, and Packaging/Assembly is supplied by AIR LIQUIDE, APPLIED MATERIALS, ASML, KMG CHEMICALS, LAM REASERCH, NAURA, SUMCO, TOKYO ELECTRON.

A typical itinerary of raw silicon to completed microchip is a fair illustration of the elaborate supply chains that emerged. Microchip's initial travel may start in the Appalachian Mountains in north America, where deposits of silicon dioxide are of the highest quality. The sand may arrive in Japan to be turned into pure ingots of silicon. The ingots of silicon are then sliced into standardized wafers, 300mm across, and sent to a "fab", a chip factory, in Taiwan or South Korea for high-tech and to China for low-tech. It is in this stage that the slices will be imprinted with a particular pattern using photolithography equipment made in Holland by AML. AML announced its compliance decision with COMMERCE DEPARTMENT and notified HUAWEI of its decision. The particular pattern will be determined by the overall design of the chip. This design might come from ARM, a British company owned by SOFTBANK. The design can be tweaked for specific applications by one of the company's many licensees.

In its next phase, it must be assembled into a package, in which the etched silicon is placed inside the ceramic or plastic containers that are dotted across any circuit board. Then testing follows. Packaging might take place in China, Vietnam or the Philippines. The integration into a circuit board could happen somewhere else again. The final result will be one of the many components that arrive at factories from Mexico to Germany to China, for assembly into a final product: an industrial robot, a smart vacuum cleaner or a tablet. China's domestic microchip industry started at the lower-value end of this process, SEMICONDUCTOR MANUFACTURING INTERNATIONAL CORP, China's largest maker of semiconductors. Fueled by a fast growing domestic market, China established NATIONAL INTEGRATED CIRCUIT INDUSTRY INVESTMENT FUND help to turn promote design and higher-value manufacturing.

The 2011 earthquake and tsunami in Japan besides revealing how globally integrated the manufacturing had become, starkly revealed that Japanese firms have been producing the bulk of chemicals and other materials to make microchips. Japanese firms had substantial control over copper foils for printed circuit boards, silicon wafers to make chips, and resin to package them. For many components Japan was the home of biggest, sometimes the only, supplier.

President Trump's WEAPONIZATION OF INTERDEPENDENCE, his threats to cut off foreign financial institutions from SWIFT banking network and the dollar clearing system for doing business with countries or entities he does not like highlighted China's vulnerabilities. One of the gravest is China's dominant role in electronics assembly. China is home to half of the world's capacity. In May 2019 COMMERCE DEPARTMENT blacklisted HUAWEI and its 70 affiliates, barring American firms from selling certain technologies without government approval to them. This shed light on another global network: microchip industry.

Around half of the modem chips to manage wireless connections of the world's baseband processors are made by QUALCOMM. Virtually all "server-class" chips used in world's data centers are made by INTEL. Chips based on designs licensed from ARM are ubiquitous in almost every advanced smart-phone. For their part, QUALCOMM, ARM and other chip designers depend on foundries to turn silicon into microprocessors. INTEL, SAMSUNG, and TSMC, in turn, rely on a bevy of specialized equipment suppliers to equip their factories. The emerged technically interdependent complexity of chip-making is multinational as its financial structure.

The mainframe did not cause the invention of the personal computer, but the wide market the mainframe created enabled the rather easy penetration of the personal computer into an expanding market. In addition, the spreadsheet is often described in histories of technologies as the killer app that caused an explosion of the personal computer market. The spreadsheet is the complement of the personal computer. Each helped the other gain market share. The personal computer did not cause but enabled the invention of word processing, and software companies like MICROSOFT emerged, which was originally founded to make the operating system for IBM personal computers.

The invention of word processing and abundant files invited the possibility of file sharing, and the modem was invented. The existence of file sharing did not cause, but invited, the invention of the WORLD WIDE WEB. The existence of the WEB did not cause, but enabled, selling on the WEB, and eBay and AMAZON emerged. And eBay and AMAZON put content on the WEB as did myriad other users, enabling the invention of WEB browsers; and also companies like GOOGLE emerged. Thence has followed social media and FACEBOOK.

Almost all of these successive innovations are the complements of the preceding ones. The existing goods and services at each state are the context in which the next good and/or service emerges. Word processing is a complement of the personal computer, the modem a complement of word processing, the WEB is a vast interconnected modem and is a complement and much more to file file-sharing. The opportunity to share files invited the invention of the modem. Accordingly, SCHUMPETER's depiction of capitalism's cycles of creation and destruction need to be modified to reflect goods and services as contexts that do not cause, but enable, the invention and introduction of the next good or service. Enablement is not a neoclassical equilibrium theory concept.

The prolonged decline in manufacturing profitability partly due to the income distribution system of MANAGERIAL CAPITALISM that the victors of WWII put in place in the rich economies, and partly due to the global overcapacity developed as the emerging economies of the world tried to catch up with the rich west, Anglo-American neoliberals have turned to globalize finance and data as one way to maintain economic growth and vitality in the face of sluggish manufacturing sector of the rich west giving birth to ASSET MANAGER CAPITALISM. All economic doctrines, but the anarchists, presuppose the existence of some kind of state, even minimal 'night-watchman-state'. The main flaw of the globalization efforts of ASSET MANAGER CAPITALISM in the last two decades of the 20th century was the attempts to integrate markets, particularly financial markets, on a global scale without a state. And, that has rendered life in the globalized markets more insecure, more criminal and less legitimate. It was the globally stateless, deregulated global financial structure that collapsed in 2008 ironically to be saved by all governments adversely effected.

As the 21st century developments in digital technologies enabled firms to generate and amass data, data have become increasingly central to firms to recast their relations with their employees, their customers, and competitors. A new business model has emerged, the platform, capable of extracting and controlling unimagined amounts of data, and with this development, there emerged gigantic monopolistic data owning centers. Primarily, platforms are digital infrastructures that enable two or more groups to interact. Instead of having to build a marketplace from the ground up, a platform provides the basic infrastructure to mediate between different groups. This is platforms' key advantage over traditional business models when it comes to data. A platform positions itself between users, as the medium upon which their activities take place, hence giving the platform the privileged access to record the users' activities and store and own them.
Moreover, digital platforms produce and depend on 'network effects', more users begetting more users which develop their innate inertia to monopolize. The ability to rapidly scale many platform businesses by relying on pre-existing infrastructure and low marginal costs with few limits to growth further enables monopolization. Platform owners set the rules of service and development, as they set marketplace interactions. In their intermediary positions, platforms gain not only access to more data but also control and governance over the rules of the game. Far from simply being the owners of data, these data giants are emerging to become the owners of the emerging infrastructures of societies in the future.

The monopolistic DNA of these platforms must be taken into account in any analysis of their effect on the broader economy. "Capitalism without competition is not capitalism." warn Jonathan Tepper with Denise Hearn in THE MYTH OF CAPTITALISM: MONOPOLIES AND THE DEATH OF COMPETITION (Tepper and Hearn, 2014). The vocal defender of the monopoly form is Peter Thiel, a Silicon Valley entrepreneur and the author of ZERO TO ONE: NOTES ON STARTUPS, OR HOW TO BUILD THE FUTURE (Thiel and Masters, 2018). Labelling the competitive-economy a "relic of history" and a "trap", he proclaims that "only one thing can allow a business to transcend that daily brute struggle for survival: monopoly profits."

FACEBOOK to "bringing the world together" requires a global monopoly. Meanwhile, GOOGLE wants to organize the world's information and AMAZON wants nothing more than all the information to serve the world's consumers. Neoclassicals' economic model to explain and predict the platform world in the making is not helpful, but actually distorting.

Since platforms are grounded on the extraction of data and generation of network effects, the following broad strategies seem to have emerged from the competitive dynamics of these large platforms. Expansion of Data Extraction Strategies by driving cross-subsidization of services to draw users into their network. Gatekeeper Strategies by positioning as a gatekeeper to occupy key positions within the ecosystem around a core business neither by horizontal nor vertical nor conglomerate mergers. They are more like rhizoidal connections driven by permanent effort to place themselves in key platform positions. Convergence of Markets Strategies. The convergence thesis is the tendency for different platform companies to become increasingly similar as they encroach upon the same market and data areas. Siloed Platform Strategies by enclosing ecosystems and funneling of data extraction into siloed platforms. Their strategic choices are being installed in the 21st century ecosystems.

Continuous production may still be going strong, in fact stronger than ever thanks to industrial robots, but it has lost its excitement of the early and middle twentieth century particularly in the United States, with the emergence of ASSET MANAGER CAPITALISM. The platform company, which uses software to bring together buyers and sellers of goods and services, represents a new kind of efficiency, based less on the organization of machines and human labor than on gathering, analysis, and exchange of data. This is disruptive business process innovation. It reduces transaction costs by matching buyers and sellers with automated software.

The platform era that began in the late 1990s with AMAZON.com entered a new phase in the 21st century with the rise of search engines, smartphones, social media, networked web-based software, and a revival of artificial intelligence. In the 1990s ALAN GREENSPAN's monetary policies fueled Wall Street's romance with platform-based efficiency and diverted capital and talent from riskier but ultimately more broadly beneficial market creating innovation to dot.com IPOs. And transferred trillions of dollars from those that bought dot.com stocks to those that sold. Retirement funds of the rich countries that fell under GREENSPAN's spell were major buyers, therefore losers. The money managers of the retirement funds, however, kept their bonuses. RASPUTIN would have envied.

The continuous process innovations did not just reduce friction. In eliminating some jobs, they created many others, often more skilled and higher paid. Some believe that this phase of technology was a one-time event that will not be repeated by 21st century platform companies. Such a view is not tweeted by President Trump who has promised to bring the off-shored jobs back to his nostalgic supporters. Now, we are in the midst of the third saltation that McAfee and Brynjolfsson call it the second machine age in THE SECOND MACHINE AGE: WORK, PROGRESS, AND PROSPERITY IN A TIME OF BRILLIANT TECHNOLOGIES (Bryniolfsson and McAfee, 2014), and in MACHINE, PLATFORM, CROWD: HARNESSING OUR DIGITAL FUTURE (McAfee and Brynjolfsson, 2017), they offer explanations of these technologies.

Nick Bostrom calls the third saltation superintelligence in SUPERINTELLIGENCE: PATHS, DANGERS, STRATEGIES (Tegmak, 2017), Max Tegmark's moniker is life:3.0 in LIFE 3.0: BEING HUMAN IN THE AGE OF ARTIFICIAL INTELLIGENCE[1]. GOOGLE's in house technology guru Ray Kurzweil declares THE SINGULARITY IS NEAR: WHEN HUMANS TRANSCEND BIOLOGY (Brynjolfsson and McAfee, 2014), and also in HOW TO CREATE A MIND: THE SECRETS OF HUMAN THOUGHT REVEALED (Kurzweil, 2013), 2018). In THE DEEP LEARNING REVOLUTION (Sejnowski, 2018), Terrence J. Sejnowski give us a concise history of learning algorithms that extract information from raw data; how information can be used to create knowledge; how knowledge underlies understanding; and how understanding leads to wisdom.

The information theory of KURT GODEL, JOHN VON NEUMANN, ALAN TURING, and CLAUDE SHANNON tells us that human creations and communications are transmissions across a channel, whether that channel is a wire or the www measure the outcome as its "news" or surprise, defined as entropy and consummated as knowledge. Entropy is higher or lower depending on the freedom of choice of the sender. The larger the available alphabet of symbols – that is, the larger the set of possible messages – the greater the composer's choice and the higher the entropy and information of the message. Information is not order but disorder, not the predictable regularity that contains no news, but the unexpected modulation, the surprising bits.

But, human creativity and surprise depend upon a matrix of regularities, from the laws of physics to the stability of money. Since these creations and communications can be business plans or experiments, information theory provides the foundation for an economics driven not by equilibrium or order but by falsifiable entrepreneurial surprises. Information theory has impelled the global ascendancy of information technology. From worldwide webs of glass and light to a boom in biotech based on treating life itself as chiefly an information system, a new system of the world is transforming our lives. And, the static neoclassical economic theory is not at all helpful in understanding this transformation, actually a hindrance.

CLAUDE SHANNON's breakthrough was mapping electrical circuits to BOOLE's symbolic logic and then explaining how BOOLEAN logic could be used to create a working circuit for adding 1s and 0s. SHANNON had figured out that computers had two layers: physical [container] and logical [the code]. While SHANNON was working to fuse BOOLEAN logic onto physical circuits, TURING was testing LEIBNIZ's language translator that could represent all mathematical and scientific knowledge. Turing aimed to prove what was called the ENTSCHEIDUNGSPROBLEM, or "decision problem", that is: no algorithm can exist that determines whether an arbitrary mathematical statement is true or false. The answer would be negative.

TURING was able to prove that no algorithm exists, but as a byproduct, he formulated a mathematical model for an all-purpose computing machine. TURING figured out that a program and data it used could be stored inside a computer. TURING's universal machine intertwined the machine, the program and the data. From a mechanical standpoint, the logic that operated circuits and switches also encoded into the program and data. The container, the program, and data were part of a singular entity. Not unlike humans. We too are containers [our bodies], programs [autonomous cellular functions], and data [our DNA combined with indirect and direct sensory information].

DATAISM regards the universe to consist of data flows and the value of any phenomenon or entity to be determined by its contribution to data processing. DATAISM was born from the confluence of life sciences that came to see organisms, since the publication of Charles Darwin's ON THE ORIGIN OF SPECIES, as biological algorithms and ALAN TURING's idea of TURING MACHINE. Computer scientists have learned to engineer increasingly sophisticated electronic algorithms. An algorithm is a methodical set of steps that can be used to make calculations, resolve problems and reach decisions. An algorithm is not a particular calculation, but the method followed when making the calculation.

DATAISM puts the two together pointing out that the same mathematical laws apply to both biochemical and electronic algorithms. DATAISM, eliminating the barrier between animals and machines, expects electronic algorithms to eventually decipher and outperform biochemical algorithms. According to DATAISM, MOZART's MAGIC FLUTE, stock market bubble, HIV virus are three patterns of data flow that can be analyzed using the same basic concepts and tools.

Humans are expected to distil data into information, information into knowledge, and knowledge into wisdom. But, DATAISTS believe that humans can no longer cope with the immense flows of data, hence they cannot distil data into information, let alone into knowledge or wisdom. The work of processing data should therefore be entrusted to electronic algorithms, whose capacity far exceeds that of human brain. DATAISTS, skeptical of human knowledge and wisdom, prefer to put their trust in BIG DATA and computer algorithms. It was biology's embrace of DATAISM that turned the breakthrough in computer science into a possibility that may transform the very nature of life.

Not only individual organisms are seen today as data processing systems, but also entire societies such as beehives, ant hills, bacteria colonies, forests and human cities. Markets are data processing systems, as HAYEK reminded us half a century ago when he argued for its superiority over central planners. According DATAISTS, free market capitalism and state-controlled communism are not competing ideologies, ethical creeds or political institutions. They are in essence, competing data processing systems. Capitalism uses distributed processing, whereas communism relies on centralized processing.

Computers and other digital advances are doing for mental power, the ability to use our brains to understand and shape our environments, what the steam engine and its descendants did for muscle power. They are allowing us to blow past previous limitations and taking us into new territory. DANIEL DENNETT in FROM BACTERIA TO BACH AND BACK: THE EVOLUTION OF MINDS (Dennett, 2017) tells the tale of human neurons, distant relatives of tiny yeast cells that are themselves distant relatives of even simpler microbes are organized in structures that are capable of astonishing feats of creativity by revisiting and extending half a century of work on the topic. Just as computers can perform complex calculations without understanding arithmetic behind it, so creatures can display finely tuned behavior without understanding why they do so. COMPETENCE

WITHOUT COMREHENSION.

People do not have a special faculty of comprehension. Rather, the human mind has been enhanced by the process of cultural evolution operating on memes. Memes are behavior that can be copied. Words are a good example. Words and other memes gave humans powerful new competences in communicating, explicit representation, reflection, self-interrogation and self-monitoring. To use a computer analogy, memetic evolution provided "thinking tools"- a bit like smartphone apps – which transformed humans into comprehending intelligent designers, triggering an explosion of civilization and technologies.

DANIEL DENNETT expects that computers will continue to increase in competence but doubts that they will soon develop genuine comprehension, since they lack the autonomy and social practices that have nurtured comprehension in humans. The so-called super-intelligence does not succeed by deeper understanding of the games of GO, CHESS, or ATARI, to cite most fashionable examples. Super AI succeeds vastly accelerating the speed of game playing, capturing much of the possibility space of bounded and deterministic regime. Daniel Dennett worries that people may overestimate the intelligence of their artifacts and become over reliant on them and that the institutions and practices on which human comprehension depends may erode as a result. How exactly this transition will play out remains unknown. Rapid and accelerating digitalization is likely to bring economic disruptions. Orthodox neoclassical toolbox you acquired will not be much help unless, block chain technology creates a virtual decentralized reality, platonic habitat for HOMO ECONOMICUS. Neoclassical market fundamentalists' utopia, but dystopia for others.

After four billion years of organic life evolving by natural selection, science is ushering in the era of inorganic life shaped by intelligent design, and the designers are human scientists. The combination of biotechnology and AI might result in physical and mental traits that completely break free of the hominid mold. YUVAL NOAH HARARI in HOMO DEUS: A BRIEF HISTORY OF TOMORROW (Harari, 2017) warns. We still share most of our bodily structures, physical abilities, and mental faculties with Neanderthals and chimpanzees. Not only our hands, eyes, and brains distinctly hominid, but also are our lust, our love, our anger, and our social bonds.

3. Dialectic evolution of the internet: from global commons to monitized private enclosures and to the emergence of splinternet

In INFORMATION RULES: A STRATEGIC GUIDE TO NETWORK ECONOMY (Shapiro and Varian, 1998), CARL SHAPIRO and HAL VARIAN popularized the term NETWORK EFFECT which came to mean that in digital world size easily begets size. Hal Varian has been described as the ADAM SMITH of the discipline of GOOGLENOMICS and the godfather of GOOGLE's advertising model.

Jack Goldsmith and Tim Wu in WHO CONTROLS THE INTERNET: ILLUSIONS OF A BORDERLESS WORLD (Goldsmith and Wu, 2018) tells the story of the death of the dream of self-governing cyber-communities that would escape geography forever, and also tells the story of the birth and early years of a new kind of INTERNET, a bordered network where territorial law, government power, and international relations matter as much as technological invention. As China and America wall off their respective digital markets from one another, each are looking for growth in the rest of the world. A divided world wide web or SPLINTERNET is already a reality, as China's internet grows behind a great firewall of censorship. AMAZON is promoting payment services in India. China's ALIPAY service is active in Brazil.

To understand the internet's recent history, it helps to keep in mind that like most digital systems, it is designed in layers. At the bottom are all the protocols that allow different sorts of networks and devices to exchange information, or INTERNETWORK; hence INTERNET. At that level, it is still largely decentralized. No single company controls these protocols, although the number of firms providing internet access has dropped sharply. The INTERNET's base was designed to move data around and publish information, so its protocols did not record what had been transmitted previously by whom.

The INTERNET was built without memory. The INTERNET's arrival seemed to herald a new way of ordering human affairs that would free us from the tyranny of territorial rule. Self-governing cyber-communities would escape geography forever. But the last decade has shown that national governments have an array of techniques for controlling offshore INTERNET communications, thus enforcing their laws, by exercising coercion within their borders. INTERNET is splitting apart and becoming bordered. Far from flattening the world, the INTERNET, its language, its content, its norms, is conforming to local conditions.

The result is an INTERNET that differs among nations and regions that are increasingly separated by walls of bandwidth, language, and filters. This bordered INTERNET reflects top-down pressures from governments that are imposing national laws on the INTERNET within their borders. It also reflects bottom-up pressures from individuals in different places who demand an INTERNET that corresponds to local preferences, and from the web page operators and other content providers who shape the INTERNET experience to satisfy these demands.

The INTERNET's design was not the result of some grand theory or vision that emerged fully formed. Rather, open design of the INTERNET was necessitated by the particularities of the specific engineering challenges. The INTERNET's creators, mainly academics operating within and outside the government, lacked the power or ambition to create an information empire. They faced a world in which the wires were owned by AT&T and computing power was a patchwork of fiefdoms centered on the mainframe computers, each with idiosyncratic protocols and systems.

INTERNET works over an infrastructure that does not belong to those using it. The owner is always someone else, and in the 1970s, it was generally AT&T in the United States. It was designed to link human brains, but it had no control over their activities than that. Egalitarianism born of necessity would persist as the network grew over decades to include everyone.

The concept of ENCAPSULATION was how a network interconnected with other networks. It means wrapping information from local networks in an envelope that INTERNETWORK could recognize and direct. In what would come to be known as TRANSMISSION CONTROL PROTOCOL [TCP] created a standard for the size and flow rate of data packets, thereby furnishing computer users with a LINGUA FRANCO [ESPERANTO] that could work among all networks. As a practical matter, this innovation would allow the INTERNET to run on any infrastructure, and carry any application, it packets traveling any type of wire or radio broadcast, even those owned by an entity as given to strict controls as AT&T.

It was an electronic information network independent of the physical infrastructure over which it ran. The invention of ENCAPSULATION permitted the layered structure of the INTERNET, whereby communications functions are segregated allowing the network to negotiate the differing technical standards of various devices, media, and applications. This was also born of necessity to link different types of networks by inventing a protocol that took account of the existence of many networks over which the creators had limited power.

TRANSMISSION CONTROL PROTOCOL/INTERNET PROTOCOL [TCP/IP] and other aspects of the INTERNET's architecture rested on the founders' beliefs about networks. In technical jargon, they created a network with "open architecture", or "end-to-end" design. In non-technical terms, the founders embraced a design that distrusted centralized control. In effect, they built strains of American liberalism, and even 1960s idealism, into the universal language of INTERNET. The INTERNET's design was open, minimalist and neutral. It was open, because it was willing to accept almost any kind of computer network to join in one universal network-of-networks. It was minimalist, because it required very little of the computers that wanted to join in. Finally, it was neutral between applications.

The INTERNET plays a central role in the American economy as it does in the Chinese. But there is a profound flaw in its architecture. Its software stack lacks a trust and transactions capability. Its OPEN SYSTEM INTERCONNECTIONS [OSI] model defines seven layers. While some of the layers have merged, none of the existing layers provide trust or validation or factuality or veracity of real monetary values. Perhaps, that abides well with the theoretical mainframe of the MBA programs: the money neutral neoclassical economic theory.

The original distributed INTERNET architecture sufficed when everything was "free", as the INTERNET was not a vehicle for transactions. When all it was doing was displaying WEB pages, transmitting emails, running discussions forums and news groups, and hyperlinking academic sites. The NET did not absolutely need a foundation of security. But when the INTERNET became a forum for monetary transactions, new security regimes became indispensable. The groups which developed the original protocols, the INTERNET ENGINEERING TASK FORCE and the WORLD WIDE WEB could have added security regimes to the rule book. But they did so, only belatedly. Perhaps, one reason was that many internet pioneers believed that the protocols would have been enough to prevent centralization. They were proven wrong.

To understand the contemporary INTERNET, one needs to start with STACKs which imitate hardware and transcend it in virtual threads and cores and chains. The seven-layer NETPLEX scheme of the OPEN SYSTEMS INTERCONNECTION model of the INTERNATIONAL STANDARDS

ORGANIZATION consists of a hierarchical stack in which lower functions are controlled by higher functions. At the bottom is the physical layer, the fiber-optic lines, microwave oscillators, mixers, 1550 and 900-nanometer lasers, photodetectors, silicon routers, erbium-doped amplifiers, and twisted-pair telephone wires, antennas, coaxial cables – the list is endless – that carry the data packets across the network at the behest of the layers above it.

In OSI stack, above the physical layer is the DATALINK. This is the medium where hardware becomes "firmware" and software that define the electrical specifications, timing rules, and electron-photon conversions that enable the transmission of information across a link from one node or computational address to the next. SWITCHES operate at level two, passing packets only to the next node. Local area networks such as ETHERNET or WiFi function at this level. The third layer is the NETWORK layer, the domain of routers, which combines with the transport layer [layer four] to establish the end-to-end links that constitute the TPC/IP INTERNET PROTOCOLS. This is the entire system of IP addresses and TRANSPORT CONTROL PROTOCOL traffic shuffles that comprises the connections from end to end across the NET.

Layer three does the headers on the packets, the identities and addresses. Layer four does the actual transmission and reception of data packets and traffic management, load balancing and ACKS [I got it!] and NACKS [I'm still waiting] that assure connections. Layers three and four tend to be the bastion of central powers, where governments and their intelligence arms chase down domain names and addresses. Layer five governs a particular two-way communication from beginning to end, whether a video stream, a SKYPE call, a SESSION INITIATION PROTOCOL conference, a messaging exchange, an email post, or a transaction. Layers six and seven are the schemes for presentations and applications – user interfaces, windows, formats, operating systems. These are summed up in schemes of hyperlinks. The 70% of all links came to be handled through GOOGLE and FACEBOOK.
The INTERNET needs a new payment method that conforms to the shape and reach of global networking and commerce. It is to obviate the constant exchange of floating currencies, more volatile than the global economy that they supposedly measure. The new system should be distributed as far as INTERNET devices are distributed: a dispersed heterarchy based on peer-to-peer links between users rather than a centralized hierarchy based on national financial institutions. It is invented and called BITCOIN BLOCKCHAIN.

On top of the existing seven layers of INTERNET infrastructure, the BITCOIN ledger builds a new layer of functionality – layer 8 – just as hypertext transfer protocol [http] builds network layer on the TRANSMISSION CONTROL PROTOCOL /INTERNET PROTOCOL [TCP/IP] network layer. This new transactions layer allows for the separation of the security and identification functions from the network. Based on new breakthroughs in information theory, security can be heterarchical rather than hierarchical – distributed on millions of provably safe devices beyond the network and unreachable from it. It is a security paradigm diametrically opposed to existing morass of passwords, usernames, PINS, personal tokens, and post-hack fixes on the network. In a BITCOIN transaction, there is no more need for the disclosure of personal information than in cash transactions.

With the ascendancy of AMAZON, APPLE and other on line emporia early in the 21st century, much of the INTERNET was occupied with transactions, and the industry retreated to the CLOUD. Abandoning the distributed INTERNET architecture, the leading Silicon Valley entrepreneurs replaced it with centralized and segmented subscription systems, such as PAYPAL, AMAZON, APPLE's iTUNES, FACEBOOK, and GOOGLE's CLOUD. UBER, Airbnb, and other UNICORNS followed. These centralized fortresses violate the COASE THEOREM OF CORPORATE REACH. "Business should internalize transactions only to the point that the costs of finding and contracting with outside parties exceed the inefficiencies incurred by the absence of real prices, internal markets, and economies of scale.", states the theorem. The industry sought safety in centralization, but centralization is not safe. It turned out to be.

Google developed the integrated model of reality combining a theory of knowledge, named BIG DATA, a technological vision, CENTRALIZED CLOUD COMPUTING, a cult of commons rooted in OPEN SOURCE software. The GOOGLE theory of knowledge, BIG DATA, is as radical as Newton's as intimidating as Newton's was liberating. Newton proposed a few relatively simple laws by which any new datum could be interpreted and the store of knowledge augmented and adjusted. Hundreds of thousands of engineers have added and are adding to the store of human knowledge by interpreting one datum at a time. John Gribbin, in DEEP SIMPLICITY: BRINGING ORDER TO CHAOS AND COMPLEXITY (Gribbin, 2004), shows how chaos and complexity permeate the universe on every scale, governing the evolution of life and galaxies alike. Far from overturning all that has gone before, chaos and complexity are triumphant extensions of simple scientific laws.

BIG DATA's approach is different. The idea of BIG DATA is that the previous slow, clumsy, step-by-step search for knowledge by human brains can be replaced if two conditions are met. All the data in the world can be compiled in a single "place", and algorithms sufficiently comprehensive to analyze them can be written. Upholding this theory of knowledge is a theory of mind derived from the pursuit of artificial intelligence. In this view, the brain is also fundamentally algorithmic, iteratively processing data to reach conclusions. Belying this notion of the brain are the studies of actual brains which show human brains to be much more like sensory processors than logic machines.

Iain McGilchrist argues in THE MASTER AND HIS EMISSARY: THE DIVIDED BRAIN AND THE MAKING OF THE WESTERN WORLD (McGilchrist, 2010) that one's feelings are not reaction to, or a superposition on, one's cognitive assessment, but the reverse: the affect comes first, the thinking later. We make an intuitive assessment of the whole before any cognitive process come into play, though they will, no doubt, later be used to 'explain' and justify, our choice. We make an assessment of the whole at once, and pieces of information about specific aspects are judged in the light of the whole, rather than the other way around. The implication is that our affective judgement and our sense of the whole, depend on the right hemisphere, occur before cognitive assessment of the parts, the contribution of the left hemisphere of the brain. Marvin Minsky in THE EMOTION MACHINE: COMMONSENSE THINKING, ARTIFICIAL INTELLIGENCE, THE FUTURE OF THE HUMAN MIND (Minsky, 2006) offers a nuanced version.

The CLOUD is the great new heavy industry of gargantuan data centers composed of immense systems of data storage and processors, linked together by millions of miles of fiber optic lines and consuming electric power and radiating heat to an extent that exceeds most industrial enterprises in history. In 2006, GOOGLE purchased ANDROID, an open source operating system that is endowing companies around the world with ability to compete with iPHONE. As ANDROID thrives, two things become apparent. The INTERNET may have ushered in a new age of sustainable open systems, but as APPLE have shown an integrated closed system monopoly remains as irresistible as ever.

The next layer up has become more concentrated, including many consumer services, from on line search to social networking. Centralization is rampant in what could be called the "third layer" of the INTERNET. All of its the extensions has spawned. APPLE's iOS or GOOGLE's ANDROID are what most people use as their smartphones' operating system. AMAZON, GOOGLE and MICROSOFT are the major competitors in cloud services outside of China. ALIBABA has a strong global lead in cloud services. In 2017 ALIBABA captured 45% of China's fledging cloud services market worth 69billion yuan [$10billion] compared to 10% for TENCENT according to BLOOMBERG. TENCET's WeChat, however, is on 4 in every 5 Chinese smartphones, and thus offers multiple products and a massive market for firms.

FACEBOOK may be the world's largest social network, but TENCENT's broad product based business model and technology is, by many measures, far superior. Less than 20% of TENCENT's revenue comes from online advertising, 98% of FACEBOOK's revenue, the other hand, is from online advertising. TENCENT has a digital assistant, XIAOWEI, a mobile payment system, TENPAY, and a cloud service, WEIYUN and also launched a movie studio, TENCENT PICTURES. In 2007, it introduced a cloud-based platform that allows companies to ssoffer services to users in WeChat via 'mini programs' [i.e. tiny apps.]. More than 1million such 'mini programs' are used by over 200million people every day, and most of them are WeChat users. TENCENT's revenue from such mini programs, for now, is marginal, and furthermore, competitors like BYTEDANCE, are crowding what is on the offer with their 'mini programs'.

Quick success develops its own downside is a folk-wisdom. In February 2019 in America, BYTEDANCE, the parent of TikTok paid $5.7million fine for illegally collecting data on users under the age of 13, and in April an Indian court banned the app on the grounds that it abets sexual predators. BYTEDANCE's largest market outside China is in India where 2 of 5 TikTok users live. According to SOUTH CHINA MORNING POST's ABACUS, BAIDU, ALIBABA, TENCENT [BAT] hold stakes in 150 companies abroad. ALIBABA has 56 data centers overseas, according to ABACUS, and TENCENT's equity in SNAP is 17.5% and 7.5% in SPOTIFY. But in 2018, THE COMMITTEE ON FOREIGN INVESTMENT IN THE UNITED STATES, [CFIUS], blocked several Chinese firms' investments, largest being $1.2billion purchase of MoneyGram by ALIBABA's ANT FINANCIAL. In 2019, Chinese firms' investments in America fell below $5billion. It was $46billion in 2016. So far, President Trump's "MAG" policies seem to be set to defer global spaghetti-like financial entanglements, not untangle them.

The data giants, AMAZON, FACEBOOK and GOOGLE, as they dominate their respective core markets, they also have accumulated more digital information than any other Western company. They use the

information they store to sell targeted advertising and to fuel the development of their artificial intelligence [AI] services. At its core, GOOGLE is a list of websites and a database of people's search histories. FACEBOOK keeps track of their users' identity and interactions among them. AMAZON collects credit-card numbers and purchasing behavior.

So far, the American data giants seem to have adopted the business model of ATTENTION MERCHANTS. They capture out attention by providing us with free information, services, and entertainment, and they then sell our attention to advertisers. The data giants seem to have far higher goals than any previous ATTENTION MERCHANTS. In 1920s, SIGMUND FREUD's nephew EDWARD BERNAYS, realized that his uncle's psychotherapy opened up a new lucrative world of retail therapy by inventing the public relations industry. Despite being far richer than kings of old, we are too easily trapped on a treadmill of consumerism, continually searching for identity, connection and self-transformation through the things we buy. EDWARD BERNAYS's method of persuasion – tastefully named 'public relations' – transformed marketing worldwide and, over the course of the 20th century embedded consumer culture as a way of life. Drawing on his uncle's insights into the workings of the human mind convinced some women on behalf of the AMERICAN TOBACCO CORP. that cigarettes were their TORCHES OF FREEDOM.

These data giants' strategic goal is not to sell adverting, their tactical goal for now is. By capturing our attention, they manage to accumulate immense amounts of data about us, [how, when, where, why we behave] which is worth more than any advertising revenue. It is not accurate to think of GOOGLE's users as its customers. There is no economic exchange, no price, and no profit. Nor do users function in the role of workers. Users are not paid for their labor, nor do they operate the means of production. The user is not the product, but rather they are the sources of raw-material supply. GOOGLE's products are derived from data about users' behavior. Its products are about predicting users without caring what the users do or what is done to the users.

In the medium term, this data hoard opens path to a radically different business model whose victim will be the advertising industry itself. The strategic business model is based on transferring decision making from humans to algorithms, including the authority to choose and buy things. Once algorithms choose and buy things for us, the traditional advertising industry will be redundant. GOOGLE is aiming to reach a point where we can ask GOOGLE anything and get the "best answer" in the world. Shoshana Zuboff in THE AGE OF SURVEILLANCE CAPITALISM: THE FIGHT FOR A HUMAN FUTURE AT THE NEW FRONTIER OF POWER (Zuboff, 2019) explains the new order in the making as an economic order that expropriates human experience as free raw material for hidden commercial practices of extraction, prediction, and sales that subordinate production of goods and services to a new architecture of behavioral modification.

In the longer term, by bringing together enough data and enough computing power, the data giants could hack the deepest secrets of life, and then use this knowledge not just to make choices for us or manipulate us but also to reengineer organic life and create inorganic life forms. Selling advertisements may be necessary to sustain the giants in the short term, but tech companies often evaluate apps, products, and other companies according to the data they harvest rather than according to the money they generate. The business model of a popular app may be a money loser, but as long as it sucks data, it could be worth billions. The rate of return analysis of corporate finance does not help much.

Tim Wu in THE MASTER SWITCH: THE RISE AND FALL OF INFORMATION EMPIRES (Wu, 20119) suggest that to understand the forces threatening the INTERNET as we know it, we must understand how information technologies give rise to industries and industries to monolithic structures. As with any economic theory, there are no laboratories but past experience. Illuminating the past to anticipate the future is the raison d'etre of economic history, which is conspicuously absent in MBA programs mass-marketed by American universities. Understandably so, because history, many times, negates their neoclassical mantra.

SCHUMPETER had no patience for what he deemed ADAM SMITH's fantasy of price warfare, growth through undercutting your competitor and improving the market's overall efficiency thereby. "In capitalist reality as distinguished from its textbook picture, it is not that kind of competition which counts," argued SCHUMPETER, but rather "the competition from the new commodity, the new technology, the new source of supply; the new type of organization." SCHUMPETER's THEORY did not account for the power of law to stave off industrial death and arrest the CREATIVE DISTRUCTION or help to speed up the destructive process by not regulating mergers and acquisitions.
ALPHABET, GOOGLE's holding company, in 2018 was the second largest company in the world. Measured by market capitalization, APPLE was first. Joined by AMAZON, MICROSOFT and FACEBOOK, the five form an increasingly feared global oligopoly.

In the 1970s, the microprocessor radically reduced the cost of computers. In the 1990s, OPEN SOURCE software started to dethrone WINDOWS, MICROSOFT's then dominant operating system. MICROSOFT might never have come to rule PC software if IBM, accused of monopolizing mainframes, had not decided in 1969 to market computers and their programs separately, a move that created the software industry. GOOGLE might not have taken off in the way it did had MICROSOFT not agreed, at the

end of its antitrust trials in America and Europe in the 2000s, not to discriminate against rival browsers and to license technical information which allows other operating systems to work easily with WINDOWS.

MICROSOFT's first operating system [MS-DOS] that MICROSOFT acquired MICROSOFT's copy of NAVIGATOR, and soon NAVIGATOR was nowhere EXPLORER was everywhere. In few short years NETSCAPE was bankrupt. With minimal antitrust enforcement, MICROSOFT would have been in a perfect position to control the future of internet, had Department of from another firm, SEATTLE COMPUTER PRODUCTS, was actually a clone of CP/M, another operating system. MCROSOFT WINDOWS was a rip-off of the APPLE MACINTOSH operating system; MICROSOFT WORD and EXCEL were copies of WORDPERFECT and LOTUS 1-2-3 respectively. By late 1990s, MICROSOFT unleashed its predatory strategy against NETSCAPE. EXPLORER was Justice not decided to prosecute the last big antitrust case of the 20th century.

FIREFOX, a web browser made by the non-profit MOZILLA FOUNDATION, was born as 'phoenix'. It rose from the ashes of NETSCAPE NAVIGATOR, slain by MICROSOFT's INTERNET EXPLORER. In 2012, MOZILLA created FIREFOX OS, to rival APPLE's IOS and GOOGLE's ANDROID mobile operating systems. Unable to compete with the duopoly, MOZILLA killed the project. Another 'phoenix' has arisen from it. KAIOS, an operating system conjured from the defunct software, powered 30million devices in 2017 and another 50millioin in 2018. Most were simple flip-phones sold in the West for about $80 a piece, or even simpler ones which Indians and Indonesians can have for as little as $20 or $7, respectively. KAIOS, based in Hong Kong, designed the software for smart-ish phones with old-fashioned number pad and long battery life, plus 4G connectivity, popular apps like FACEBOOK and features like contactless payments without snazzy touchscreens. GOOGLE invested $22million in KAIOS in 2018. Even if KAIOS powers another 70million devices in 2019, as the company expects in 2019, that would barely be one tenth of the 1.5billion APPLE and ANDROID phones sold annually.

A decade ago American firms took an early lead in 4G setting standards for new handsets and applications that spread word-wide. That dominance helped APPLE, GOOGLE, and other American businesses generating billions of dollars in revenues. China learned its lessons, investing $180billion to deploy 5G networks over the next 5 years and assigning swathes of wireless spectrum to three state providers. In America the same part of the spectrum is largely off-limits commercially because it is used by the federal government. American firms are experimenting with different parts of the spectrum that has some advantages under laboratory conditions but easily blocked by buildings and trees.

The potential consequences of the market power held by the new technology giants are greater and more pernicious than anything seen at the turn of the 20th century. Then the market power of companies like SWIFT, STANDARD OIL, AMERICAN TOBACCO, The AMERICAN SUGAR REFINING COMPNAY, or US STEEL allowed them to raise the price they charged for food, steel, tobacco, sugar and oil. Now, it is about more than just the price.

The equivalent course of action now is to force today's giants to open up their data vaults, thus lowering the barriers to entry and giving newcomers a better chance to compete. Now it is the turn of data. Today online applications bundle user interface, code and data. FACEBOOK, for example, is known for its website and app, but both are just the tip of a virtual iceberg. Most of the software and all the information that keep social network going live in the firm's CLOUD. Controlling those data gives these companies power. Users are free to move to another service, but they would lose all that information, including the links to their friends.

EUROPEAN COMMISSION fined GOOGLE 4.3billion Euros on 7/18/2018 and ordered to GOOGLE to stop emulating the 1990s MICROSOFT's product strategy. To assure its market lead, instead of giving the buyers the option to choose, MICROSOFT bundled several software in tie-in contracts and offered the bundle to the buyers. GOOGLE's case involved its mobile operating system, ANDROID, and bundled related software and services, such as GOOGLE PLAY, its app store, INTERNET search and several other apps. GOOGLE, in practice, gives smart phone makers and telecoms operators an all or, nothing choice as MIROSOFT did in the 1990s. If, the makers want to install any of these programs on their devices, they have to install them all and show their icons in prominent positions. Since firms need at least the app store to make their products commercially viable, they have no choice but to comply. Furthermore, GOOGLE does not allow the phone manufacturers to install competing versions of ANDROID on any of their models.

By contrast, in WEB 3.0 interface, code and data are meant to be kept separate. This would allow power to flow back to users, who would decide which application can access their information. If they were not happy with one social network, they could easily switch to another. With such

decentralized applications, [DAPPs], users could also interact directly with other users without an information-hoarding intermediary in the middle. Similar ideas have been tossed around. Decentralized services, then called "peer-to-peer" briefly flourished in the late 1990s and 2000s. They fizzed out mainly because a robust decentralized database did not exist.

Combining database and network technologies, BLOCKCHAIN is a digital peer-to-peer decentralized platform for tracking all kinds of value exchanged between people. Its name derives from the blocks of data, each one a snapshot of all transactions that have just been made in the network, which are linked together to create a chain of data blocks, adding up to a minute-by-minute record of the network's activity. Since, that record is stored on every computer in the network, it acts as a public ledger that cannot be altered, corrupted or deleted, making it a highly secure digital backbone for the future of e-commerce and transparent governance.

With the invention of BLOCKCHAIN, a ledger without a centralized administrator maintained collectively by some of its users, called "miners", who also protect the BLOCKCHAIN and keep others in check a robust decentralized system is feasible. The BLOCKCHAIN is a specialized database in the form of an immutable record of the transaction history, a digital BABYLONIAN TABLETS. Most WEB 3.0 projects comes with SMART CONTRACTS, snippets of code that encapsulate business rules which are automatically executed if certain events occur. The advanced projects focus on building the software infrastructure needed for DAPPs. BLOCKSTACK, arguably very ambitious, is seen as an operating system for such applications. One digital currency that uses BLOCKCHAIN technology is ETHEREUM, which among its possible applications, is enabling electricity micro-grids to set up peer-to-peer trading in renewable energy. These micro-grids allow every nearby home, office or institution with a smart meter, INTERNET CONNECTION, and solar panel on its roof to hook in and sell or buy surplus electrons as they are generated, all automatically recorded in units of the digital currency. Such decentralized networks, ranging from a neighborhood block to a whole city, build community resilience against blackouts and cut long-distance energy transmission losses at the same time.

The landscape of Chinese FINTECH is dominated by two players: ANT FIANCIAL of ALIBABA, and TENCENT, best known for WeChat, its social media network. ANT was estimated to be worth $150billion in 2017, a little less than HSBS. Both firms got their start in payments. ANT FINANCIAL stems from ALIPAY created in 2004, TENPAY was launched in 2005 for QQ, TENCENT's online-messaging platform, and was later grafted into WeChat. Both have boomed by linking mobile apps with offline payments. Almost all merchants in China provide QR codes to be scanned by phone in order to pay. In 2017, ALIPAY had 54% of the mobile-payment market. It worked with more than 250 financial firms outside of China so that Chinese tourists can use it.

ANT and TENCENT are more interested in hooking users on other financial services than in payments alone. Once a user is on their platforms, mutual funds, insurance products, and virtual credit cards are accessible with a tap of a finger on smart phone. The duo's move into retail banking with TENCENT's WeBank and ANT's MyBank increased regulator's concerns for money-laundering, but also protecting the banks from FINTECH's competition.

The control structures built to ensure the ironclad hold of the founders of corporations are referred as "Key man risk", and is a big point of contention in China and abroad. China does not allow foreign entities to own sensitive assets, such as government licenses needed. These licenses are owned by Chinese individuals, often including the founders, are bundled into VARIABLE INTEREST ENTITIES. In addition, the Chinese companies listed in America have "dual class" stock structure which allows founders to own a special class of stocks with superior voting rights. JD.com, for example, ALIBABA's rival in e-commerce, has the ratio set at one share to 20 votes, enabling Richard Liu, the founder of JD.com, to control 80% of JD.com voting rights by owning less than 20% of the stock. JD.com has not convened an annual stockholders' meeting since its floatation in 2014 which is allowed under corporate governance laws of Cayman Islands where it is incorporated as most global Chinese tech champions are. Cayman Islands, one of Britain's Caribbean territories, seem to be the most favored location to incorporate for Chinese companies set to list in New York. BAIDU, for example, listed in America in 2005, and to list it incorporated in Cayman Islands, but has not held a stockholder's meeting since 2008. TENCENT of BAT is different. It has VARIABLE INTEREST ENTITIES, but one-stock-one-vote, and listed in Hong Kong in 2004.

Another first of GOOGLE in Silicon Valley was to introduce a dual-class share structure with its 2004 public offering. The two founders, PAGE and BRIN, would control the super-class B voting stock, shares that each carried 10 votes, as compared to the A class of shares, which each carried only 1 vote. The arrangement inoculated PAGE and BRIN from market and investor pressures. Subsequently, the founders imposed a tri-share structure adding a C class of zero voting rights stock. By 2017, BRIN and PAGE controlled 83% of the super-voting-class of B shares, which translated into 51% of the voting power.

When GOOGLE's leads, many Silicon Valley founders follow. By 2015, 15% of IPOs were introduced with dual-class structure, compared to 1% in 2005. In 2012 FACEBOOK's IPO with a two-tiered stock structure left MARK ZUCKERBERG in control of voting rights. The company then issued nonvoting class C shares in 2016, solidifying ZUCKERBERG's personal control over decisions. While the consequences of these share structures are being debated, absolute corporate control enabled the founders of GOOGLE and FACEBOOK to aggressively pursue acquisitions of start-ups in facial recognition, deep learning, augmented reality and more.

BRIN and PAGE at GOOGLE who do not enjoy the legitimacy of the vote, democratic oversight, or the demands of shareholder governance exercise control over their organization and presentation of the world's information, but neither do BAIDU's and ALIBABA's CEOs. ZUCKERBERG at FACEBOOK who does not enjoy the legitimacy of the vote, democratic oversight, or the demands of shareholder governance exercise control over an increasingly universal means of social connection along with the information concealed in its networks. So does JACK MA.

JACK MA, a founder of ALIBABA is a member of the Chinese Communist Party, and indirectly owns four of its five VARIABLE INTEREST ENTITIES with one of his co-founders. In 2019, when JACK MA steps down as chairman, as he said he would, all VARIABLE INTEREST ENTITIES will be transferred to two layers of holding companies, in turn owned by a broad set of ALIBABA's senior Chinese staff. JACK MA will remain a lifetime member of the ALIBABA Partnership, which concentrates control of the company in a club of 36 senior staff. ALIBABA Partnership is empowered to appoint majority of board seats. Thus, Jack Ma will keep to have an influential role in the company's culture and ecosystem. This succession plan will unite ALIBABA's, CHAIRMAN and CEO, under DANIEL ZHANG. He has been an adroit CEO for ALIBABA since 2015. The succession plans of the founders of the Chinese tech firms who are now in their 40s and 50s, is expected to develop new challenges for global corporate governance in the next decade.

4.How to fit a fast changing world into a static theory

In 2017 the UK's ECONOMIC AND SOCIAL RESEARCH COUNCIL have let it be known that it was setting up a network of experts from different disciplines including psychology, anthropology, sociology, neuro-science, economic history, political science, biology and physics whose task it would be to revolutionize the field of economics. Eric D. Beinhocker in THE ORIGIN OF WEALTH: EVOLUTION, COMPLEXITY AND THE RADICAL REMAKING OF ECONOMICS (Beinhocker, 2007) makes the reasons for this spirit of revolutionary zeal apparent enough. While both biological and economic systems share the core algorithm of evolution – differentiate, select, and amplify – and thus have similarities. Their realizations of evolution are in fact different and must be understood in their individual contexts. Director of the CENTER FOR COGNITIVE STUDIES, Daniel Dennett in DARWIN'S DANGEROUS IDEA: EVOLUTION AND THE MEANING OF LIFE (Dennett, 1995) presents evolution as a general purpose algorithm for creating 'designs without a designer'.

The notion that the economy is an evolutionary system is a radical idea because it directly contradicts the mainstream paradigm of economics that portrayed the economy as a system that moves from equilibrium point to equilibrium point over time, propelled along by external shocks from technology, politics, changes in consumer tastes, and other external factors. But it is far from a new idea. Richard Nelson's and Sidney Winter's AN EVOLUTIONARY THEORY OF ECONOMIC CHANGE (Nelson and Winter, 1982) was an early attempt to marry evolutionary theory to economics, and the recently developed tool of computer simulation. J. Stanley Metcalfe in EVOLUTIONARY ECONOMICS AND CREATIVE DESTRUCTION (Metcalfe, 1998) integrates many of the relevant themes into a formal analytical treatment based around Fisher's Principle, a central theme in his evolutionary theory; namely that variety drives change.

Substrate-neutral algorithmic theory, with John H. Holland's landmarks ADAPTATION IN NATURAL AND ARTIFICAL SYSTEMS: AN INTRODUCTORY ANALYSIS WITH APPLICATIONS TO BIOLOGY, CONTROL AND ARTIFICIAL INTELLIGENCE (Holland, 1992), and HIDDEN ORDER: HOW ADAPTATION BUILDS COMPLEXITY (Smith, 1982); John Maynard Smith's EVOLUTION AND THE THEORY OF GAMES[1], and Stuart Kauffman's ORIGINS OF ORDER: SELF ORGANIZATION AND SELECTION IN EVOLUTION Kauffman, 1993) provided germ seeds that have flourished COMPLEXITY ECONOMICS that views the economic system as a complex adaptive system as W. Brian Arthur of SANTA FE INSTITUTE summarizes in COMPLEXITY AND THE ECONOMY (Arthur, 2015).

Theoretical physicist Geoffrey West of SANTA FE INSTITUTE, a pioneer in the fields of complexity science, in SCALE: THE UNIVERSAL LAWS OF GROWTH, INNOVATION, SUSTAINABILITY, AND THE PACE OF LIFE IN ORGANISMS, CITIES, ECONOMIES, AND COMPANIES (West, 2017) explains why some companies thrive while others fail, why the rate of innovation continues and why this dynamic threatens global sustainability.

Almost half a century ago, in THE ENTROPHY AND THE ECONOMIC PROCESS (Georgescu-Roege, 1971) Nicholas Georgescu-Roegen's basic insight was that economic activity is fundamentally about order creation, and that evolution is the mechanism by which that order is created. He argued that while the biological form of the human species continues to evolve slowly, or 'endosomatically', through our genes, we are at the same time rapidly evolving 'exosomatically' through our culture. Georgescu-Roegen was not the first to make this observation. Darwin saw this as an implication of his theory, and 1960s Pierre Teilhard de Chardin in THE FUTURE OF MAN (Teilhard de Chardin, 2004) developed a philosophy based on the idea of endosomatic and exosomatic evolution. Nor was Georgescu-Roegen was the only economist looking to cultural evolution for answers.

Friedrich Hayek wrote about cultural evolution in THE CONSTITUTION OF LIBERTY (Hayek, 1978) and Kenneth E. Boulding presented his theory in ECODYNAMICS: A NEW THEORY OF SOCIETAL EVOLUTION (Boulding, 1979). It was Georgescu-Roegen, though who grounded his theory in science, in particular the connection between evolution and the SECOND LAW OF THERMODYNAMICS, the principle that the universe is inevitably moving from a state of low entropy to a state of high entropy. Economic systems exist in the real physical world, therefore, they must obey the same law of entropy as everything else in the universe does, was his argument.

David Orrell in QUANTUM ECONOMICS: THE NEW SCIENCE OF MONEY (Orrell, 2018) offers another out from the orthodoxy as do Alexander Wendt in QUANTUM MIND AND SOCIAL SCIENCE: UNIFYING PHYSICAL AND SOCIAL ONTOLOGY (Busumeyer and Bruza, 2012), as do Jerome R. Busemeyer and Peter D. Bruza in QUANTUM MODELS OF COGNITION AND DECISION[1]. In mathematical finance quantum physics-inspired methodology offers some computational advantages over usual statistical approach, but also changes the way one thinks about financial system, from being a mechanistic system with additional randomness, to a world of overlapping alternative possibilities, in which uncertainty is intrinsic to the system rather than an extra added feature. The emerging fields of quantum cognition and quantum social science, meanwhile, take a broader inspiration from quantum mechanics to think about how human beings make decisions and interact with one another.

Mainstream neoclassical economics is based on a NEWTONIAN picture of the economy as a mechanistic system, made up of self-interested atomistic individuals who interact only by exchanging goods and services and move the markets to a stable equilibrium thus viewing price changes as random perturbations. Money has no important role and acts primarily as an inert medium of exchange. For the past 150 years, neoclassical economics has clung to a number of assumptions that were mostly at odds with reality. Such as the idea that the economy is a self-stabilizing machine that maximizes utility composed of atomistic units like independent NEWTONIAN particles that can be understood and predicted using deterministic laws, and the idea of rational economic man, HOMO ECONOMICUS, the atomistic unit which forms the core of neoclassical models. Economic agents were viewed as particles, while marginal utility or disutility for a particular commodity defined as satisfaction gained from consuming one more unit or more unit of it was viewed as a force acting in a kind of commodity space.

A property of NEWTONIAN dynamics is that it can be expressed mathematically as a kind of optimization problem. Objects moving in a field take the path of least action, where 'action' represents a form of energy expenditure. Following the same script, neoclassical economists assumed that in the economy, individuals act to optimize their own utility by spending their limited resources. Economists could then make NEWTONIAN calculations about how prices would be set in a market economy, to arrive at what WILLIAM STANLEY JEVONS called a "mechanics of self-interest and utility".

One area where HOMO ECONOMICUS played a conspicuous role was the field of JOHN VON NEUMANN's game theory. A key technique in game theory was BROUWER's FIXED-POINT THEOREM, which is a method for demonstrating that a system of equations, in this case representing the possible outcomes of a game, has a stable and optimal solution. GAME THEORY was initially developed for economics, but came into its own in developing the doctrine of MUTUALLY ASSURED DESTRUCTION [MAD] during COLD WAR. According ssto MAD, rational actors can achieve a stable equilibrium if both know that starting a war will lead to instant annihilation of both sides. It is also used as an explanation of PEOPLE'S BANK OF CHINA's accumulation of high dollar reserves in 21st century. Though, the doctrine of MAD did not prevent President Trump from declaring trade wars to implement his selective protectionism.

HOMO ECONOMICUS also played a role in KENNETH ARROW and GERARD DEBREU's proof that, again involved BROUWER's FIXED-POINT THEOREM, showed based on a highly idealized version of market economy, that free markets lead to an optimal 'fixed point', in which prices are set at their correct levels, and nothing can be changed without making at least one person worse off, a condition known as PARETO OPTIMALITY. But to accomplish this feat, the powers of HOMO ECONOMICUS had to be extended to include infinite computational power and the ability to devise plans for every future eventuality. The ARROW-DEBREU model seemed to provide mathematical proof of ADAM SMITH's invisible hand, SMITH's theory that free markets are inherently self-stabilizing and set prices to their optimal levels.

The ARROW-DEBREU proof inspired the development of GENERAL EQUILIBRIUM MODELs and later DYNAMIC STOCHASTIC GENERAL EQUILIBRIUM MODELs [DSGE] which are still relied on by policy makers today in spite of their failure in 2008 FINANCIAL CRISIS. DSGE models deal in aggregates, ignore complexity, see the economy as an equilibrium system, and flatten the intricate structure of an economy down to a single uniform dimension. The name is misleading. 'Dynamic' refers only to changes to a model equilibrium over time as it adjusts to external shocks, not to any internal dynamism. 'Stochastic', meaning randomly determined, refers to random perturbations such as oil price shocks or technological developments which are treated as external effects. But these external effects come from a stable distribution and so can be estimated from past experience, and linear in the sense that small shocks have small effects and a shock twice as big as another has double the effect. "General" means that the model is supposed to include all markets, but omits derivatives and other forms of financial entanglements. The models assume that supply and demand drive prices to an equilibrium point where consumers are maximizing their utility, firms are maximizing their profits, and all markets clear.

DSGE models embedded into the RATIONAL EXPECTATIONS HYPOTHESIS, [REH], and REAL BUSINESS CYCLE, [RBC], structure a number of nominal rigidities and market imperfections. Most common were price and wage rigidities and various forms of consumer myopia. These allowed for temporary demand shortages, on which central bank policy could have a significant short-run impact. In accepting the REH and RBC theory as the framework for macroeconomic analysis, DSGE modelers surrendered Keynes's emphasis on uncertainty. In DSGE models, there was no uncertainty, only contingently imperfect information within known probability distributions. DSCE models have a very limited role for the existence of money, medium of exchange, and thus provides an ideal diversion from the important facts of reality.

Instead of behaving like independent NEWTONIAN particles, as assumed in mainstream neoclassical economics, participants of economic activities are actually closely entangled and engaged in a sort of collective quantum dance. As Karen Barad puts it, "Existence is not an individual affair. Individuals do not preexist their interactions; rather, individuals emerge through and as part of their entangled intra-relating."

We need to reorient our focus to understand human behaviors and preferences as they are, not as they find it easy to model. Most real world resource allocation decisions are made by humans whose brains include a prefrontal cortex capable of ratiocination and limbic system which is coded by evolution to act in deeply instinctive and emotional ways. Marvin Minsky, the co-founder of the ARTIFICIAL INTELLIGENCE LABORATORY of MIT, in THE EMOTION MACHINE: COMMONSENSE THINKING, ARTIFICIAL INTELLIGENCE, AND FUTURE OF THE HUMAN MIND (Minsky, 2006) shows the way how the human cognitive system can be studied to develop artificial intelligence to aid in improving resource allocation decisions as more and more such decisions are being assigned to be made by artificial intelligence [AI] enabled machines. And in THE SOCIETY OF MIND (Minsky, 1986), he claims that what we call 'intelligence' is not a singular thing; rather, it is an emergent phenomenon that arises from collective interactions of many individual parts. The magic of intelligence is that when those parts are organized in a particular way, they can do things that no individual part could do on its own. Minsky called this description of intelligence 'the society of mind'.

Iain McGilchrist in THE MASTER AND HIS EMISSARY: THE DIVIDED BRAIN AND THE MAKING OF THE WESTERN WORLD (McGilchrist, 2010) suggest that attention is not just another function alongside other cognitive functions. Rather, the kind of attention we bring to bear on the world actually alters the nature of the world we attend to. Attention changes what kind of a thing comes into being for us. In that way it changes the world. This transformative or world-changing aspect of attention can be seen in

every form of relationship we encounter and experience. Adjusting our mode of attention can have far-reaching and profound effects, and one might call this striking ability 'the attention effect'. As a remarkable a phenomenon in its way as recognition in quantum mechanics of how the act of observation alters what is being observed. This is because, 'I am my attention, everything else is given, is not mine.'

This unique role of attention has also been recognized in the new digital technologies of the modern 'attention economy', in which the human gaze is increasingly being monetarized and mined as a resource, again pointing to its central position in the landscape of the 21st century. The free service producers of Silicon Valley compete to capture our attention and emotional engagement and monetarize them to generate the cash flow necessary for their survival. The internet scene in China is different. The major source of their cash flow is not from advertising.

The objective of science is said to be not to pander to human preconceptions but to reduce our ignorance and folly. Cognitive science, in Nick Bostrom's SUPERINTELLIGENCE: PATHS, DANGERS, STRATEGIES (Bostrom, 2016), and in Max Tegmark's LIFE 3.0: BEING HUMAN IN THE AGE OF ARTIFICIAL INTELLIGENCE (Tedmark, 2013) is at the threshold of a breakthrough in artificial intelligence that may change how allocative decisions are to be made. In THE DEEP LEARNING REVOLUTION (Terrence and Sejnowski, 2018), Terrence J. Sejnowski shows how learning algorithms extract information from raw data; how information can be used to create knowledge; how knowledge underlies understanding; and how understanding leads to wisdom. Ray Kurzweil in THE SINGULARITY IS NEAR: WHEN HUMANS TRANSCEND BIOLOGY (Kurzweil, 2005, 2013) and in HOW TO CREATE A MIND: THE SECRET OF HUMAN THOUGHT REVEALED (Kurzweil, 2005, 2013) explain why and how.

The singularity or artificial superintelligence involves computers whose ability to understand and manipulate the world dwarfs our own, comparable to the intelligence gap between human being and, say, earth worms; developing utopians and dystopians. The utopians, Ray Kurzweil, GOOGLE's guru in residence for example, envisions a radical future in which humans and machines fully merge to expand our consciousness and conquer mortality. Other utopians see ARTIFICIAL GENERAL INTELLIGENCE enabling us in decoding the mysteries of the physical universe, understanding the universe at levels that humans cannot conceive of, and solving intractable problems. Dystopians disagree.

Algorithms increasingly make choices for us. More and more, these algorithms work by learning from the trails of data we leave in our newly digital world. Machine learning is the automation of discovery. It enables intelligent robots and computes to program themselves. The scientific method on steroids. In THE MASTER ALGORITHM: HOW THE QUEST FOR THE ULTIMATE LEARNING MACHINE WILL REMAKE OUR WORD (Domingos, 2015), Pedro Domingos outlines each one of the machine learning' five major schools of thought -"symbolists", "connectionists", "evolutionists", Bayesians, and "analogizers"- has its own master algorithm, a general purpose learner that you can in principle use to discover knowledge from data in any domain. The symbolists' master algorithm is inverse deduction, the connectionists' is backpropagation, the evolutionists' is genetic programming, the Bayesians' is Bayesian inference, and the analogizers' is the support vector machine. At its core machine learning is about prediction. Predicting what we want, the result of our actions, and how we achieve our goals from digital metadata. Neoclassical economics belong to the symbolists' tribe.

It is time to explain the financial markets as they actually operate, not as neoclassical economists assume them to operate, observing the way in which information is processed, observing the serial correlations, bonanzas, and sudden stops, not assuming these away as noise around the edges of efficient and rational markets. We need to present the world as is, not the world as neoclassical economists have assumed to make their mathematics easy. Economic history matters. We need to study the history of financial crashes as well as the theories and mathematics that failed to forecast them, but were required to formalize them.

At various stages in history the lust for easy riches has spread out from the afflicted few to consume the whole classes of society. This happened in Amsterdam in the 17th century when the road to riches was apparently strewn with tulips. In London in the 18th century when it was not so much a road as a seaway to the South Seas. In London again in the 19th century when it was railroad. In New York in the early 20th century when it was indeed a road, a railroad, and an airway combined, and in the late 20th century when it was the information superhighway.

All of these were 'bubbles', a period of rapidly rising equity prices in a particular sector that were unfounded and thus liable to collapse equally rapidly. Carlota Perez's TECHNOLOGICAL REVOLUTIONS AND FINANCIAL CAPITAL: THE DYNAMICS OF BUBBLES AND GOLDEN AGES (Perez, 2002) demonstrates that big changes in technology entailed not just the extraordinarily rapid growth of few industries, but a 'techno-economic paradigm shift'. ALAN GREENSPAN in 1990s used the expression to sell his monetary policy that made the dot.com bubble possible to Congress.

There is an observable to pattern to economic booms and busts. They start with an anticipated exciting change in the economy. Managers and investors with the help of spin doctors collectively create a story about it, which initially begins as a plausible explanation, then morphs into an extrapolation, and then into an exaggeration. Eventually the data contradict the narrative, as optimism turn into pessimism boom turns into bust, and a bout of austerity follows. A rout in platform companies' stock prices since August 2018 has led many to ask if the tech industry is experiencing the classic sequence of Greek drama: HUBRIS, ATE and NEMESIS for the second time in two decades. First, in the second half of the 1990s ending in March 2000, and the second, since September 2018. De ja vu. The level of hype was particularly high, a consequence of ubiquity of data on the internet and some of the numbers were decidedly soft.

Rarely in stock market history have so many investors made so much money from so few stocks going up for so long. Some 37% of the rise in the value of all firms in the S&P500 index since 2013 is explained by 6 of its members: ALPHABET, AMAZON, APPLE, FACEBOOK, MICROSOFT and NETFLIX. About 28% of the rise in Chinese equities over the same period is owing to 2 firms: ALIBABA and TENCENT. The median drop in value of those eight firms has been 21% in September and October 2018, double the decline in global stock markets. Some $900billion has vaporized by the end of October 2018. WALMART paid $16billion to buy 77% of FLIPKART, an Indian e-commerce firm which in November 2018 is expected to lose $1billion in 2019 and more thereafter before the market rout which according to TV talk-heads are caused by a rise in global real interest rates, but also by decelerating growth, falling profit forecasts as a result, and rising capital intensity. Total investment for the 8 firms was $180billion a year between 2013 and 2018. Only one of the 8 firms needed capital markets to finance itself, NETFLIX.

We need to ask questions about objectives of economic activity. In defining the objectives of economic activity, the instrumental conventional wisdom, which have dominated the policy implementations of neoclassical economists for several decades, has simply assumed that maximizing growth in per capita GDP is an axiomatically desirable objective, and that inequality is justified because it helps maximize growth. Many circumstances conspire to extinguish scientific discoveries, especially those that cause discomfort about culture's sacred norms. As species, we cling to the familiar, comforting conformities of the mainstream. Deep inquiry into the objectives of economic activity and into the links between economic variables, such as income, and fundamental objectives, such as sustainability of human well-being in its universe, GAIA, the living Earth, is essential to good economics for our survival, no matter how difficult.

There is compelling evidence that the biological and physical components of our planet are part of a single network that operates in a self-regulating way to maintain conditions that are broadly suitable for the existence of life, but that undergoes fluctuations on all scales, including ice age-interglacial rhythms and mass extinctions, analogous to the fluctuations that occur in self-organizing systems on the edge of chaos. GAIA theory is a way of studying structuring matter at a molecular scale by slotting each atom into its needful place. It is a way of understanding flows of energy on every scale from that of the smallest living cell to that of the whole living planet. It an approach of understanding of growing order and surprise in a universe that its physical respects tend towards entropic stagnation. Life is Earth's entropy reduction process.

The concept GAIA postulates the idea that the Earth is alive. Aspects of the atmospheric gases and surface rocks and water are regulated by the growth, death, metabolism, and other activities of living organisms. The entire planetary air system is "metastable", stable in its reactive instability. The persistence of chemical reactivity arises from the combined actions of living beings. The entire planetary surface, not just the living bodies but the atmosphere that we think of as an inert background, is so far from chemical equilibrium that the entire planetary surface is best regarded as alive. The Earth is a single, mega-living system. Symbiosis is simply the living together in physical contact of organisms of different species. Partners in symbiosis, fellow symbionts abide in the same place at the same time, literally touching each other or even inside each other. A nuanced view of universe, not akin to neoclassical economists'.

Lynn Margulis explains that view in SYMBIOTIC PLANET: A NEW LOOK AT EVOLUTION (Margullis, 1998). She shows that symbiotic origins of novel life forms, symbio-genesis, has been far more common than ever

dreamt by evolutionary biologists steeped in the DARWINIAN tradition. A tradition that emphasizes competition far more than cooperation in the evolutionary process. Orthodox economists' overemphasis of atomistic competition empowered by AI and algorithms of digital platforms can in fact lead to wasted efforts, missed opportunities, and above all an inability to break out of established patterns argues Edward Tenner in THE EFFICIENCY PARADOX: WHAT BIG DATA CAN'T DO (Tenner, 2018).

More and more of what we choose to spend our money on is itself some form of knowledge. More and more of things we wish to buy are not things, they are not "things" at all. They are intangible; that is to say, strictly speaking, they are neither a good nor a service. They are non-things, products of human mind, not manufactures but MENTEFACTURES. Examples include computer software, medical treatments, films, recorded music. We have reached a stage where knowledge produces knowledge. The knowledge components of consumption goods possess some striking characteristics. The same characteristics as knowledge applied to the production process. They occupy no physical space and have no weight. Consequently, they take up no real resources whatsoever. If I consume more I do not reduce the quantity available for you to consume. Infinite expansibility. Whether a film is seen by 200 or 2,000,000 or more people has no effect on its cost of production. Orthodox economists' quandary.

Jeremy Rivkin in THE ZERO MARGINAL COST SOCIETY: THE INTERNET OF THINGS, THE COLLABORATIVE COMMONS, AND THE ECLIPSE OF CAPITALISM (Riykin, 2015) heralds "zero marginal cost society" where the price of every incremental good and service, from search to software, from news to energy, will plunge towards "free" as every device and entity in the world is subsumed in an INTERNET OF THINGS where exponential network effects yield a new economy of leisure and abundance.

THE FINANCIAL CRASH OF 2008, in the long sweep of history, may prove as a radical turning point as the 1929 crisis of free market capitalism, FINANCIAL CAPITALISM, that in the 1930s gave birth to MANAGERIAL CAPITALISM, and the crisis of managerial capitalism in the 1960s and 1970s that evolved to ASSET MANAGER CAPITALISM from 1980s to 2008. The GREAT DEPRESSION of the 1930s led to a regime devoted to the maintenance of full employment. The GREAT INFLATION of the 1970s led to the maintenance of low inflation. The GREAT ILLUSION of the 1990s, some claim, will lead to a regime devoted to the maintenance of financial stability. So far in October 2018 according to elegant Christine Laggard of IMF, in President Trump's America evidence is supportive of increased risks of financial instability.

For more than 50 years, the dominant strain of academic economics has been concerned with exploring, through complex mathematics, how economically rational human beings interact in markets. The conclusions reached have appeared optimistic, indeed at times PANGLOSSIAN. KENNETH ARROW and GERARD DEBREU illustrated that a competitive market economy with a fully complete set of markets was Pareto-efficient. Neoclassical economist, ROBERT LUCAS, argued that if human beings are not only rational in their preferences and choices but also in their expectations, the macro economy will have a strong tendency toward equilibrium, with sustained involuntary unemployment, a non-problem. RATIONAL EXPECTATIONS THEORY.

Neoclassical economics have developed models of firms behaving as monopolies, duopolies, and perfect competitors, but in the realm of few firms their modeling and predictions run into difficulty. Mainly, because in modeling, they assume economic agents to be hyper-rational and well informed, time to be instantaneous, and place nonexistent, economic agents to be represented by a single prototype, and are left isolated seeking equilibrium in a system fraught with change. The message of neoclassical economics is that is humans can just behave rationally enough, and if we possess enough information, then the economy will be revealed as a universe of clockwork predictability. Even the uncertainty of neoclassical economics is of the well-behaved kind. The dream of clockwork universe ended for science in the 20th century, and is to end for economics in the 21st. The economy is too complex, too nonlinear, too dynamic, and too sensitive to the twists and turns of chance to be amenable to prediction over anything but very shortest of terms.

The EFFICIENT MARKET HYPOTHESIS appeared to illustrate that liquid financial markets are driven not by the patterns of chartist phantasy but by efficient processing of all available information, making the actual price of a security a good estimate of its intrinsic value. Economists therefore provided arguments for the proposition that totally free markets achieved the objective of allocative efficiency. And they also argued that allocative efficiency and income growth over time were desirable objectives, and that increased income delivered increased utility, which they equated with life satisfaction. This was in part because any deeper inquiry into the relationship between income and welfare or happiness would have interfered with mathematical precision, which required a precisely defined maximand. Regrettably, as a description of neoclassical academic economics, this may be construed as simplification.

Overhauling the way economics is taught is to produce students better equipped to understand the modern world if that is the goal. Even better, it should improve the discipline's ability to describe and predict the economic reality.

The economic crisis is also a crisis for economic theory. Most analyses of the evolution of the 2008 crisis invoke three themes – contagion, networks, and trust – yet none of these play a major role in orthodox economic theory, argues Alan Kirman in COMPLEX ECONOMICS: INDIVIDUAL AND COLLECTIVE RATIONALITY (Kirman, 2011). The economy and the financial sector had organized itself into a highly interdependent system. Paradoxically, the excessive interlocking of the components and the heavy trading of the derivatives actually concealed information rather than revealed it. Thus, the system organized its own self destruction, leading to a radical change in the aggregate situation. This is interaction and interdependence and breakdown of relations of trust which had emerged and not one of an external shock to a stable market. The direct interaction between individuals, firms, and banks does not simply produce imperfections in the functioning of the economy but is the very basis of the functioning of a modern economy.

The economy needs to be considered as a complex adaptive system in which the agents constantly react to each other. We are familiar from statistical physics and biology for example, the behavior of the aggregate cannot be deduced from the behavior of the average or "representative" agent. Just as the organized activity of an ants' nest cannot be understood from the behavior of a "representative ant". All ants are endowed with "competence without comprehension". The macroeconomic phenomena should not be deduced from the representative individual and the representative firm. Though, the representative firms are managed by people endowed with "comprehension".

The neoclassical economic theory considers each "representative agent" in isolation, but "representative agent's" fitness is a complex function of all "representative agents". If "representative agents" are independent, the relative frequencies of their variants rapidly converge to the maximum fitness point and remain in equilibrium thereafter. But if "representative agents" interact, evolution – the search for maximum fitness – is vastly more complex. Echoing Fred Hoyle's observations in THE INTELLIGENT UNIVERSE: A NEW VIEW OF CREATION AND EVOLUTION (Hoyle, 1988), the universe is "an inextricable loop where everything exists at the courtesy of everything else". For instance, if electrons were much lighter, there would be no stable stars, and if they were much heavier, there could be no ordered structures such as crystals and DNA molecules. If protons were 0.2% heavier, they would decay into neutrons unable to hold electrons, so there would be no atoms. If they were instead much lighter, then neutrons inside of atoms would decay into protons, so there would be no stable atoms except hydrogen.

JOSEPH SCHUMPETER believed that speculative manias often occur with the inception of a new industry or technology, when people overestimate the gains and underestimate the effects that the attraction of new capital will have in depressing returns. CHARLES KINDLEBERGER, in MANIAS, PANICS AND CRASHES: A HISTORY OF FINANCIAL CRISES (Kindleberger, 2005), suggested something similar. The first stage is displacement, which excites speculative interest. This is followed by positive feedback, as rising stock prices attract new investors who then drive prices up further. The final stage is euphoria, when investors take leave of their senses.

In JOSEPH SCHUMPETER's writings, the economy evolves by cracks and leaps. Booms and busts are endemic, and are to be welcome as the result of the economy's life force. Similarly, he excoriated the orthodox economist's emphasis on the benefits of perfect competition and even thought that monopoly could be beneficial as a spur to innovation. Physicists call a sudden change in the character of a system a phase transition. In random networks, the phase transition from small clusters to giant clusters happens at a specific point, when the ratio of segments of edges to nodes exceeds the value of 1. One can think of the ratio of one edge to one node as the 'tipping point' where a random network suddenly goes from being sparsely connected to densely connected. THE S CURVE is the shape of phase transitions of all kinds, the shape of creative destruction, ice melting, the spread of new technologies, paradigm shifts in science, the fall of empires. THE TIPPING POINT could well be entitled the S CURVE. Many phenomena we think of as linear are in fact S CURVES, because nothing can grow without limit. Because of relativity, and contra NEWTON, acceleration does not increase linearly with force, but follows an S CURVE centered at zero.

5. Not so representative agents in their ever changing diverse environments

The contemporary American business corporation, though legally a creature of the state from which it derives its charter, has a substantial but somewhat indefinite sphere of autonomy and privacy. In the United States it is known as "corporate personhood". The American legal system considers a corporation to be an individual in many ways, bizarrely one that is psychopathic in the sense of having no conscience and being solely interested in profits. Its defining features are limited liability and profit maximization. The corporation is therefore a tool for generating wealth while limiting responsibility.

In 1886 the MICHIGAN SUPREME COURT ruled that a corporation was entitled to the same legal status as a person, with rights including freedom of speech. In 1916, when HENRY FORD tried to prioritize business investments over dividends, his stockholders successfully sued. The court ruled the main purpose of a corporation is to maximize the shareholders' profits. As MILTON FRIEDMAN wrote in 1962, "Few trends could so thoroughly undermine the very foundations of our free society as acceptance by corporate officials of a social responsibility other than to make as much money for their stockholders as possible." Corporations are rational economic man, HOMO ECONOMICUS, writ large, according to orthodox neoclassical economic theory. Like the individual citizen, the corporation is taxed and regulated and may be rewarded with public employment, punished for mischief by judicial action, and possibly called on for sacrifice in the national interest, and once in a while, may be saved from bankruptcy with generous handouts, as the western banks' bailouts were in the GREAT FINANCIAL CRISIS. The people running a corporation are occasionally criminally responsible when the corporation has done something illegal. However, they are not when the corporation does something legal yet immoral.

There is much more to any system of managerial process than meets the eye by studying the charts of organizations which are intended to represent the structure of organizations. The impressive thing about the organizational environment of corporations, although not unique to them, is the extent to which rationality is expected, encouraged, and even enforced. Substantial resources are devoted to developing information and to the discussion of its implications for action. Where rationality becomes institutionalized, that is, becomes a socially sanctioned rule of conduct, the legally prescribed institutional structure and performance that specify how actions and interactions ought to be are important elements that cannot be overlooked. But actual alternatives of managerial styles are affected by all sorts of other factors. These are the necessities of economics with linkages to the political and social system.

The motivations and the habits of the decision makers of the corporations are also influenced by their personal, unique situations - the precise points in their bureaucracies at which they find themselves. Yet there have been demonstrable periodic regularities in the ways they were managed, as there have been differences in the ways they were run when their habitat changed from FINANCIAL CAPITALISM [- The Great Depression], to MANAGERIAL CAPITALISM, [New Deal – Thatcher-Reagan Liberalism], and then to ASSET MANAGER CAPITALISM I[1980s – 2008 The Great Financial Crisis]. ASSET MANAGER CAPITALISM II and/or STATE CAPITALISM [2008-].

6. Managerial dictatorship or market chaos

Paul Seabright in THE COMPANY OF STRANGERS: A NATURAL HISTORY OF ECONOMIC LIFE (Seabright, 2010) explains how the shirt he bought in New York had its cotton grown in India from seeds developed in the United State; the artificial fiber in the thread came from Portugal and the material in the dyes from at least 6 other countries; its collar linings came from Brazil and the machinery for weaving, cutting, and sewing from Germany; the shirt itself was made up in Malaysia. The project of making a shirt and delivering to Paul Seabright in New York has been a long time in planning, since well before two winters ago when an Indian farmer outside of Coimbatore planted the seeds he bought from the MONSANTO's distributor. Engineers in Cologne and chemists in Birmingham were involved in the preparation many years ago. A marvel of global production with no authority in charge. The firms that make up the many links in different countries with different legal infrastructures in the chain that supplied the shirt at point of purchase had merely obeyed market prices.

The metaphor of the pin made famous by ADAM SMITH does not have a single maker, but 25 persons involved, all collaborating without a central planner, a collaboration the mainstay of 18th and 19th century classical and classical economic theory. But, the economists of the day failed to shed light on the question of why some activities were directed by market forces and others by firms, and what the determinants of an economy's infrastructural organization were.

According to Ronald H. Coase, "Firms are a response to the high cost of using markets, transaction costs" (Coase, 10990). So he wrote in 1937. Instead of negotiating and enforcing separate contracts for every transaction, it, generally, costs less to manage tasks by fiat. In markets for standardized goods and services such "transaction costs" are low, argued RONALD COASE. A well-defined task can easily be put out to the market, out-sourced, where a contractor is contracted and paid an agreed sum for doing it. The firm comes into its own when simple contracts of this kind will not suffice. Alternatively, an employee is contracted to follow varied and changing instructions, up to agreed limits, for a contractually agreed salary. Thus, the hierarchical authority structure of the firm trumps the invisible hand of the market. With the advance of platform corporation, the boundary between the firm and the market might appear to be dissolving altogether. The share of self-employed contractors in the global labor force has risen. In the "gig economy" exemplified by UBER [DIDI in China] drivers are mushrooming.

Open APPLICATION PROGRAMING INTERFACES, API, enable organizations to offer access to their platforms without taking enormous risks or offering much in the way of support. Multiple players participate in a broadly open ecosystem of developing, using, and refining computer applications as well as data that flow between them. From the perspective of those who develop on these platforms, API can provide important shortcuts that can help to avoid reinventing the wheel on the way towards offering customers breakthrough product, but running the risk that the organization offering the platform service [FACEBOOK, APPLE, MIROSOFT, et.al] might unexpectedly pull the rug out from under them. The promises of this emerging ecosystem by AI empowered machines, platforms and crowds are tremendous, but the full implications of this inter-reliance remain to be seen. The global business systems turbo charged by CHIMERICA and lesser degree by the other members of BRICS [Brazil, Russia, India, South Africa] are changing the global ecosystem fast as the rich, the emerging and the poor societies move deeper into the information economy. But in this 21st century chaos lies opportunities that will shape how employees-employers, customers-suppliers are going to relate to each other, and the epistemology of neoclassical economics does not help.

The idea behind open innovation is as simple as powerful. The creators of new ideas do not have to be within your organization in order to be helpful. Recent advances in IT have made the frictionless sharing of experiences and lawyer-free integration of platforms possible. Yet firms have not withered away in globalized 21st century, and in President Trump's version. Managerial dictatorship of the firm with differing institutional arrangements between the firm's "stakeholders" [its customers, suppliers, creditors, CEO and staff, employees, investors, sovereign governments, international institutions [IMF, WORLD BANK, BIS, WTO, NAFTA, EU] and the very visible as well as the textbook-invisible hand of the market chaotically co-exist, for now.

Nick Srnicel in PLATFORM CAPITALISM (Srnicel, 2017) offers an overview of the emerging landscape by presenting five different types of platforms: ADVERTISING PLATFORMS [e.g. GOOGLE, FACEBOOK] which extract information on users, undertake analysis, and the use the products of that process to sell ad space; CLOUD PLATFORMS [e.g. AWS, SalesForce] which owns hardware and software of digital dependent businesses and are renting them out as needed; INDUSTRIAL PLATFORMS [e.g. GE, SIEMENS] which build the hardware and software necessary to transform traditional manufacturing into internet-connected processes that lower the costs of production and transform goods into services; PRODUCT PLATFORMS [e.g. ROLLS ROYCE, SPOTIFY] which generate revenue by using other platforms to transform a traditional good into a service and by collecting rent or subscription fees on them; and LEAN PLATFORMS; [e.g. UBER, Airbnb] which attempt to reduce their ownership of assets to a minimum and to profit by reducing costs as much as possible. These analytical divisions can and often do run together within any one firm.

Artificial intelligence is barging its way into business. Firms of all types are harnessing AI to forecast demand, hire workers and deal with customers. In 2017, companies spent $22billion on AI related mergers and acquisitions. Even after 2008 financial catastrophe, it is still fashionable to do it in the financial markets rather than in R&D shops. Regardless of how it is acquired, AI is not only changing how the work place is managed, but the managerial process itself.

AMAZON has a patented a wrist-band designed to tract the hand movements of warehouse workers that uses AI guided vibrations to nudge employees into making the "right" moves and eliminate the "wrong", and resultantly make warehouse workers more efficient. FREDERICK TAYLOR

would have approved. Another software company, WORKDAY, crunches around 60 factors to predict which employees will leave the company by collecting and analyzing 60 factors, such as pay, time between holidays taken and turnover in managers to whom the employee reports, and flags those at risk of quitting and for-warning Human Resource departments. Still another startup, HUMANYZE, sells smart ID badges that can tract employees around the office and reveal how well they interact with their colleagues. ID badges the size of a credit card and depth of a book of matches are strapped on employees' wrists to collect data to be analyzed. The ID badges contain a microphone that picks up employees' conversations with each other; BLUETOOTH and infrared sensors are to monitor employees' locations; and an accelerometer records when they move. AI makes ubiquitous surveillance worthwhile, because every bit of data is potentially valuable for DATA ANALYTICS. The idea behind the project is not panoptic or scrutiny according to the founders' description. So, they claim. The revenue of HUMANYZE come not only from sales of hardware and software but from the use of data their badges generate for HUMANYZE.

ALEX PENTLAND, the director of HUMAN DYNAMICS LAB within MIT's MEDIA LAB, the godfather of wearables, especially GOOGLE GLASS, the author of SOCIAL PHYSICS: HOW SOCIAL NETWORKS CAN MAKE US SMARTER (Pentland, 2015), and HONEST SIGNALS: HOW THEY SHAPE OUR WORLD (Pentland, 2008) and his students have spent last two decades inventing instruments and methods that can transform all of human behavior, especially social behavior, into highly predictive math. One result was to introduce the SOCIOMETER, a wearable sensor that combines a microphone, accelerometer, BLUETOOTH connection, analytic software, and machine learning techniques designed to infer the structure and dynamic relationships in human groups.

PENTLAND and his teams have worked to crack the code on the instrumentation and instrumentation of social processes in the name of a totalistic social vision founded on a comprehensive means of behavior modification. In 2010, PENTLAND founded SOCIOMETRIC SOLUTIONS to apply the rigors of his SOCIAL PHYSICS to captive populations of office workers. By 2015, the company rebranded itself: HUMANYZE. Its technology is described as a platform that uses a "smart employee badge to collect employee behavioral data, which it links to specific metrics with the goal of improving business performance.

BEN WABER, its CEO, portrays the company's work as "money ball" for business enabling any organization to manage its employees like sports team based on measures that reveal how people move through the day, with whom they interact, their tone of voice, if they lean into listen, their position in the social network across a variety of office situations, and much more, all of it to produce 40 separate measures that are then integrated with a "business metric dashboard" in PEOPLE ANALYTICS: HOW SOCIAL SENSING TECHNOLOGY WILL TRANSFORM BUSINESS AND WHAT IT TELLS US ABOUT THE FUTURE OF WORK (Waber, 2013).

An artificial intelligence enhanced video-interview service, HireView, video-interviews candidates as HireView's AI program analyzes the facial expressions, body postures and the verbal skills, intonation and gestures of the candidates. Such machine-sorting can be helpful for companies that recruit globally when candidates are from different cultures or speak another first language, but with the worrisome possibility of rejecting the wrong candidate. Video-interview is the first step of the recruitment process in HireView, only when applicants pass the video-interview they meet some humans of the Human Resources Departments. Another recruitment service company, PYMETRICS, helps to develop data about candidates without conventional qualifications by providing games that ignore factors such as gender, race and level of education for candidates to play. The candidates are also tested for some 80 traits such as memory and attitude to risk. PYMETRICS then uses machine learning to measure applicants against top performers and predict their suitability for a role. PYMETRICS aims to helps the recruiter to identify employable among candidates without conventional qualifications.

In another start-up, COGNITO's AI-enhanced software listens to customer-service calls and assigns an "empathy score" based on call centers' agent's compassion and capability in settling complaints. Among employee surveillance startups, VERIATO, goes so far as to track and log every keystroke an employee makes on his computer in order to gauge employee's commitment to the company. VERIATO's software searches for signals that may indicate poor productivity and malicious activity, like stealing company records, and scans e-mails to gauge how employee's sentiment changes over time. Companies can use services offered by SLACK to sift through not just employees' professional communications but their social-media profiles too. SLACK stands for searchable log of all conversation and knowledge. AI and DATA ANALYTICS empowered employee surveillance systems are changing the work environment, redefining the rights and obligations of employees and employers. Few laws exist to govern how data are to be collected at work, and many employees unguardedly consent to surveillance when they sign their employment contract. The emerging work environment of the 21st century is beginning to look very different from the 20th. So far, managerial authority seems to be the expanding its sphere of control at the expense of reduced sphere of decision options of the employees.

At MICROSOFT employees can track their own movements with MyAnalytics, a program which puts together data from e-mails, calendars and show employees how they spend their time, how often they are in touch with key contacts and whether they multitask too much. MyAnalytics is a feedback tool provided to the employee mainly for self-help, it is not designed as a surveillance tool to enhance managerial control mechanism. MyAnalytics also aggregates the data and offers the summaries to the employees to help them manage their departments and see how their teams are doing.

AMAZON has an in-house Optimization Squad, a unit that writes algorithms AMAZON uses to constantly streamline its own operations. In AMAZON's fulfilment centers, vast warehouses more than 100 in North America and 60-odd around the world, the packages move on conveyor belts at the speed of an escalator in a shopping mall. The deafening noise of the facility is matched by conspicuous lack of humans. There are, instead, thousands of yellow 6 feet tall cuboid shelving units inside a fenced-off area, the size of a football field. In AMAZON's vernacular, they are "pods". These pod are shuffled by hundreds of robots in and out of neat rows by sliding beneath the pods and dragging them around. Associates, human workers in AMAZON's terminology, are assigned to stations at gaps in the fence that surrounds this 'robot field'. Some of the associates pick items out of pods brought to the by a robot, others pack items into empty pods, to be whirred away and stored. For the system to keep track, the associates pick or place an item, scan the product and the relevant shelf with a bar-code reader. To minimize the down-time of human workers and have faster flow of goods through the warehouse, the amount of down-time human workers has to wait before a robot drags a pod to their station need to be shorter and fewer. Optimization squad for fulfilment centers are developing these algorithms for robots.

AMAZON has an AI body-tracking system pilot project that AMAZON refers as NIKE INTENT DETECTION which is to track what the associates pick and place on shelves to get rid of the hand-held bar-code reader. Such manual scanning by the associates takes time that can be saved if the cameras can keep track. What AMAZON GO is to do for shoppers, NIKE INTENT DETECTION is to do it for fulfilment associates. It is to track what they pick and place on shelves. AMAZON's algorithmic venture, a cashier-free grocery, AMAZON GO, that watches shoppers with a bank of hundreds of cameras converting visual data into a 3D profile that track hands and arms as they handle a product. AMAZON GO records which items shoppers pick up and bills them to their AMAZON account when they leave the store.

Platform companies' reality can best be understood by deciphering the hidden DNA of AMAZON, APPLE, FACEBOOK, and GOOGLE [ALPHABET], the American disruptors, and their Chinese counterparts, ALIBABA, BAIDU, TENCENT, XIAOMI, HUAWEI, ZTE, OPPO, LENOVO, HAIER to understand how they are changing the rules of business. FACEBOOK and GOOGLE suck up two-thirds of America's on line ad revenues. AMAZON controls more than 40% of the country's booming online shopping market. In some countries GOOGLE processes 90% of web searches. Not only is the message but the platform is also the market.

The gig economy is assembling a reserve force of atomized laborers who wait to be summoned, via electronic foremen, to deliver people's food, clean their houses or act as their chauffeurs. The 21st century lumpen proletariat, some say. Figures from the BUREAU OF LABOR STATISTICS, released on June 7, 2018 show that group of American workers to be only 10.1% of the employed. Not an alarming figure supporting the much heralded decline of the conventional jobs in recent years caused by disruptive platform companies.

As with its Great Firewall, China was able to prevent American firms from taking on Chinese rivals in China, and Chinese companies were kept out of America, Europe fell under the spell of Silicon Valley before Chinese tech had matured. APPLE was an exception to flourish in China. But now, ALIBABA is taking on AMAZON, BAIDU is matched against GOOGLE, and TENCENT is to prove its technological superiority against FACEBOOK. They have very different strategies, however. American firms typically set up outposts firm scratch. They fund subsidiaries that offer much of the same service to Indians or Mexicans as their domestic users might expect. One-size-fits-all.

ALIBABA's strategy in emerging markets, on the other hand, has been not to set up shop itself, but instead to invest in local companies. ALIBABA's partners include PAYTM and BIGBASKET in India, TOKOPEDIA in Indonesia, LAZADA in Singapore, DARAZ in Pakistan, TRENDYOL in Turkey.

Since GOOGLE and FACEBOOK earn bulk of their revenue from advertising, and therefore, there is less incentive to localize, and furthermore, their optimization algorithms reflecting factor scarcities of America make little efficiency sense in emerging markets' price priorities. Chinese firms' competitive advantage, by contrast, has come from being able to process payments and organize distribution of goods in a country where doing such things had previously been tricky. "One size fits all" solutions are hard to implement. Partnership with local entrepreneurs is the Chinese customized strategy.

The annual conferences of AMAZON, FACEBOOK and GOOGLE held to announce new tools, features, and acquisitions, send shock waves of fear through venture capitalists and entrepreneurs of Silicon Valley. Venture capitalists attend to see which of their companies are going to fall in "kill-zone" around the giants. Tech giants try to squash startups by copying them, or they pay to scoop them up early to eliminate a threat. The idea of a kill-zone may bring to mind MICROSOFT's long reign in the 1990s, as it embraced a strategy of "embrace, extend, and extinguish" and tried to intimidate startups from entering its domain. But entrepreneurs' and venture capitalists' concerns are striking because for a long while afterwards, startups had free rein.

Venture capitalists are wary of backing startups in online search, social media, and e-commerce. The wariness comes from seeing what happens to startups when they enter the kill-zone, either deliberately or accidentally. Amazon's cloud service, AMAZON WEB SERVICES, [AWS], have labelled many startups as "partners", only to copy their functionality and offer them as a cheap or free service. A giant pushing into startup's territory, while controlling the platform that startup depends on for distribution, makes life tricky. The KRONOS EFFECT is the efforts undertaken by a dominant company to consume its potential successors in their infancy. Understanding this effect is critical to understanding the cycle of from open to closed system, from a freely accessible channel to one strictly controlled by a single corporation or cartel.

By 2017, FACEBOOK managed, unchallenged by ANTITRUST authorities, 67 acquisitions, AMAZON undertook 91 and GOOGLE got away with 214. In this way, the tech industry became essentially composed of just a few giant trusts as their competitors became marginalized with every passing day says Tim Wu in THE CURSE OF BIGNESS: ANTITRUST IN THE NEW AGE (Wu, 2013).

The monopolistic structure that typified the 20th century information industry found its footing on the INTERNET when APPLE while it had always wavered on openness, committed itself to work exclusively on the network of AT&T, to a set of ideals well aligned with the interests of the faltering old media, the entertainment conglomerates, and newspaper magnates like Rupert Murdoch. While a difficult partner in many respects, APPLE provided the old monopolistic firms a rejuvenation at last via the INTERNET through the great promise of the iPAD. Combination of APPLE, AT&T and entertainment conglomerates was welcome after the spectacular failure of AOL and TIME WARNER merger. As APPLE befriended the old monopolistic media, GOOGLE remained the de facto leader of a different coalition that depended on the WWW and an open INTERNET when the early 21st century dream of vertically integrated MICROSOFT-GE, AOL TIME WARNER, and COMCAST-DISNEY fell apart.

In China, fewer and fewer tech startup companies are able to escape the radar screens of BAIDU's, ALIBABA's and TENCENT's investment groups on the look-out for potential winners. In 2019, BAT as the tech triumvirate is known, has already invested, directly or indirectly, in more than half of the 124 startups counted as "unicorns" [those worth $1billion or more] according to IT JUZI, a database of startups in Beijing reports The ECONOMIST (The Economist, 2018). By the time firms hit the $5billion mark, over 80% have taken a form of BAT investment. The KRONOS EFFECT with Chinese letters. Of the three, two are bigger. Even after declines in tech stock prices in the third quarter of 2018, ALIBABA and TENCENT are still worth close to half a trillion dollars. Lately, both have moved out of their core business into areas as varied as financial services, bike-sharing, ride-haling and food delivery, clashing along the way. Gracefully maturing and increasingly powerful, they are ruthlessly blocking and tackling not only each other, but any firm that sides with the enemy, and not only in China anymore.

To the Chinese, the scene of American venture capital firms may seem familiar, a scaled down version of the Chinese scenario. "Kill-zone" is the metaphor that describes acquisitive investment strategies of technology giants, AMAZON, FACEBOOK and GOOGLE, in acquiring startups particularly in consumer-internet products. According to McKINSEY, a consultant, America's giants make just 5% of all domestic venture capital investments, whereas BAT account for close to half of those in China. TENCENT has a portfolio of 600 stake-holdings acquired during 2012-2017. ALIBABA and TENCENT are offering more than just large checks. They offer their platforms. TENCENT's WeChat counts over 1billion users. ALIBABA's emporia are home to 1million merchants. Through WeChat PAY and ALIPAY, their competing payment systems, ALIBABA and TENCENT account for 94% of mobile transactions.

Venture capitalists, in the United States, shy away from backing startups whose business centers on the consumer-internet, when the preferences of GOOGLE and FACEBOOK are conspicuously evident. In China, however, that is not yet the case, because of sufficient availability of early-round financing. Many Chinese venture capitalists' strategy is try to identify the sparkiest startups, anticipating generous sell-out later when the giant steps in to buy. When TENCENT invested $600million in MOBIKE, a shared-bike startup in 2017, ALIBABA countered with a $700million stake in a rival OFO, forcing dozens of smaller competitors out of the race, but richly rewarding those venture capitalists that provided early-round financing for MOBIKE and OFO. The government is unlikely to break up the "walled gardens" that giants have built around their offerings, in which startups must also operate so long as the giants follow the government's directives in directing its knowhow according to the state's industrial plans.

The narrow profit maximizing efficiency focus of corporations has inspired the launch of an OPEN SOURCE CIRCULAR ECONOMY movement. Its worldwide network of innovators, designers and activists aims to follow in the footsteps of open-source software by creating the knowledge commons needed to unleash the full potential of circular manufacturing. The full regenerative potential of circular production cannot be reached by individual companies seeking to make it all within their own factory walls. If every tractor, refrigerator and laptop manufacturer attempts to recover, refurbish and resell all and only its own brand of products within proprietary cycle of material flow. The system wide regenerative potential cannot be achieved.

OPEN SOURCE CIRCULAR ECONOMY movement believes that circular manufacturing must be open source because the principles behind open source design are strongest fit for the circular economy's needs. Those principles include modularity, that is making products with parts that are easy to assemble, disassemble and rearrange; open standards, that is designing components to a common shape and size; open source, that is full information on the composition of materials and how to use them; and open data, that is documenting the location and availability of materials. In the collaborative commons, millions of innovators are defying the mainstream economic theory that without intellectual property protection innovators, not being able to recoup their costs, will not bring new products to market. They are co-creating and using free open-source software known as FOSS as well as free-open source hardware, FOSH. GLOBAL VILLAGE CONSTRUCTION SET demonstrates step-by-step how to build from scratch 50 universally useful machines, from tractors to wind turbines. OPEN BUILDING INSTITUTE aims to make open-source designs for ecological, off-grid, affordable housing available to all.

Many WEB 3.0 projects have developed their crypto-economic models after SATOSHI MAKAMATO pointed the way. The idea is to replace a centralized firm with a decentralized network, held together by incentives created by a token – a kind of "crypto-co-operative". All those involved, including the users, are meant to have a personal stake in the enterprise and get their fair share of the value created by a protocol. The invisible hand of the market replacing "the firm". SATOSHI MAKAMATO provided the tools for the defenders of JEFFERSONIAN CAPITALISM to challenge the enshrined HAMILTONIAN centralized corporate hierarchy of managerial authoritarianism as AI enabled HAMILTONIAN corporation incorporated the invisible hand of the market to manage its internal affairs, CROWD SOURCING, is flattening the layers of corporate hierarchy of managerial authoritarianism.

7. 20th century lessons

By the 1910s, the Unites States had surpassed the United Kingdom as the world's largest economy. The reason was largely the strength of US manufacturing companies, which accounted for approximately 50% of the country's GDP at the time. American factories were powered first by flowing water that turned waterwheels, then by steam. Around the start of the 20th century, electricity appeared as another viable option. It first gained traction as a more efficient replacement for the single big steam engine that sat in the basement of factories and supplied power to all of their machines. Electrification was one of the most disruptive technologies ever. In the first decades of the 20th century, it caused something close to mass extinction in US manufacturing industries.

At the start of 20th century, manufacturing industries in the United States were dominated by "industrial trusts". They were large companies born of mergers. Their owners aimed at to take advantage of scale economies in production, purchasing, distribution, and marketing. Certain trust builders also hoped to create companies so large that they would become monopolies able to set prices. A survey published in 1904 tallied more than 300 such trusts, managerial dictatorship a l'Americaine. The THIRD REICH coopted the state and the industrial cartels as the Japanese state coopted ZAIBATSUs to form uber managerial dictatorships not only to compete with Moscow's monolithic command-control system, but also quickly solve the mass misery of the GREAT DEPRESSION.

Consider a listing of the top American companies from about 1910 or so. It would include U.S. STEEL and BETHLEHEM STEEL, STANDARD OIL, and GULF, SWIFT ARMOUR, and GENERAL FOODS, AT&T, GENERAL ELECTRIC, and WESTINGHOUSE, ANACONDA COPPER, and ALCOA, DUPONT, and AMERICAN TOBACCO. At the time, US industrial trusts seemed positioned to reign for a long time. They were well capitalized, staffed by the first generation of professional managers, and far from hostile new technologies. They learned to communicate by telegraph and ship goods via railroad, and switched from steam to electric power in their factories. A survey in 1935 found that over 40% of the industrial trusts formed between 1888 and 1905 had failed by the early 1930s.

The great shake-up in the early 20th century American manufacturing had multiple causes, including the upheavals of WWI and President TEDDY ROOSEVELT's trust-busting crusade, but the many shocks of electrification were one of the fundamental reasons why so many top companies failed or floundered. The big gains came not from simple substitution of electric motors, but from the redesign of the production process itself that involved techno-economic paradigm shift.

Except for companies from new industries, like GENERAL MOTORS and RCA, the listing of companies in 1970s is much the same as they were at the start of 20th century. Despite all the vicissitudes of mergers, name changes, and antitrust, the top companies in 1910 mostly held their positions for the next seventy years.

The successful companies of the early 1900's had emerged from the most savagely Darwinian Industrial maelstrom in history. ROCKEFELLER, CARNEGIE, and their ilk, clawed to the top through ruthless efficiency and lethal execution. The best German or British chemical and steel companies could beat the Americans in this or that niche, but across the board the United States possessed the most formidable array of industrial power ever seen.

And then Americans slacked off. Almost as soon as US STEEL was born from a string of mergers in 1901, its chief, Elbert Gary, started working out market-sharing and the price maintenance agreements with his competition. US STEEL was born controlling more than half the market. Gary argued that if his fellow steel moguls just adopted U.S. Steel's high price structure, they would each maintain their market shares, and all could flourish together. After the standard break up in 1911, the oil industry fell into a similar pattern, and eventually so did newer industries, like automobiles and televisions. A steel company chief once explained the logic of price maintenance to a Senate antitrust committee: "If we were to lower our prices, then it would be met by our competitors, and that would drop their profit, so we would still be right back to the same price, relatively."

War preserved and extended Americans' hegemonies. Companies could wax fat on wartime weapons orders and post war reconstruction, and at the same time, help destroy their overseas competitors. A 1950s steel sales executive bragged, "Our salesmen don't sell steel; they allocate it." But by defanging competition, Gary's system of "administered pricing" froze technology. The locus of innovation in steel-making shifted to Europe and Japan.

In the United States, MANAGERIAL CAPITALISM emerged out of the Great Depression and its set up was characterized by stable high economic growth and shared prosperity. Indeed, the 25 years following World War II were called the "Golden Age" of capitalism. Prior to the Great Depression, FINANCE CAPITALISM prevailed in the United States. It was characterized by a small government, gold standard constrained with little regulation of banking and finance or anything else, and a growing income and wealth inequalities, essentially laissez faire capitalism. As a consequence, the economy was much more financially unstable and recorded numerous, frequent, and prolonged economic contractions.

From 1931, the size of government spending progressively grew and with the NEW DEAL, a new stage of capitalism progressively emerged that increasingly involved the federal government in macroeconomic and regulatory affairs, MANAGERIAL CAPITALISM. Partly due to federal government's involvement in macroeconomic management, the distribution of income and wealth narrowed and real income grew across all income categories. A broad range of households benefitted from the prosperity and were able to increase and maintain their standard of living without recourse to debt.

Prior to 1933, The FEDERAL RESERVE operated under a gold standard domestically and externally, and it was constrained in its discounting operations by the Real Bills Doctrine. GOLD RESERVE ACT of 1934 removed any obligation to convert U.S. currency into gold on demand, and forbade any contractual clause requiring final payment in gold. In addition, the GLASS-STEAGAL ACT of 1933 ended the Real Bills Doctrine by allowing any economic unit access to the DISCOUNT WINDOW, and by allowing the latter to accept any type of collateral. By making the U.S. dollar an inconvertible currency domestically, and by broadening the powers of the Federal Reserve, the United States acquired more, but not full, monetary sovereignty and so acquired more financial flexibility to promote economic and financial stability. In addition to a big bank, a big government was also created through a large increase in federal expenditures and purchases.

KEYNES proposed that in normal circumstances there is not enough effective demand from private firms and households to ensure the use of all potential resources, resources which could be brought into use by existing technology and business organization. Therefore, government policies should add to private demand, not just in a downturn, but in normal times. The governments' budgets' proper job was not to balance the governments' accounts, but to balance the nations' accounts – aggregate supply and demand- at full employment. Whether this required a budget surplus, zero balance, or deficit depended on the state of aggregate demand. In principle, therefore, the budget could be used to restrain demand as well as to increase it, with the fiscal multiplier giving a precise arithmetic estimate of both.

Governments could calculate the difference between potential and actual output and adjust taxes and spending accordingly. Monetary policy was to support fiscal policy. Interest rates were to be kept permanently low, their main purpose being to minimize the cost of capital and enable the government to borrow as cheaply as possible. The political implications of KEYNESIAN policy were contentious. Conservative politicians, committed to reducing taxes, gravitated towards monetary policy as part of their long-term goal of minimizing the state's role in allocating capital, and assign the management of the business cycle to the weaker of the two possible options: the monetary policy.

FIRE [Finance, Insurance, Real Estate] was a much smaller portion of the GDP and so was consumer finance in banks' loans. Bankers did not entice households and companies to use a lot of leverage to improve their economic well-being. Bankers' profitability rested on a careful examination of creditworthiness of borrowers and the establishment of long-term recurring relationships, rather than the aggressive expansion of their market by increasing debt loads. An originate-and-hold banking model, and labor conditions promoted sustained shared prosperity. Union membership was at its peak in the United States in 1950s with about a third of the employed and a quarter of the labor force. Given its institutional characteristics, and the politico-economic environment, MANAGERIAL CAPITALISM was less prone to financial instability with the decline of economic volatility. Not only were the financial crises less numerous during the post war era but they were also milder.

The WWII had subordinated capitalism to society. KEYNESIANISM was part of the democratic attempt to keep control over capitalist economy in peacetime. All Western governments were committed to ACTIVIST REAL OUTPUT MANAGEMENT with big differences between the kind of activism they thought was needed. Sweden practiced a form of SUPPLY-SIDE KEYNESIANISM derived from the STOCKHOLM SCHOOL. A high level of welfare spending was coupled to activate labor market measures to force up labor productivity: a policy tailor-made for a small export-economy. The French state, which emerged from the war as the nation's chief investor, had experimented with STATISM since COLBERT in the 18th century. The German post-war economic policy, on the other hand, was influenced by the FREIBURG SCHOOL that rejected both NAZISM and STATE SOCIALISM. It accepted the original liberal belief in a competitive market system, but thought that the gaps in classical thought needed to be filled not by the state budget, but by a constitutional framework. This was necessary to protect competition from distortion, see benefits equally distributed and protect markets from the encroachment of government. These ideas coalesced in ORDO-LIBERALISM and the SOCIAL MARKET ECONOMY. The independent BUNDESBANK became the monetary pillar of the new German constitution. ORDO-LIBERALISM blended with industrial co-partnership in a German version of incomes policy.

Taking the advanced countries as a whole, a Keynesian commitment to full employment was a common element in a wider mix of

national compromises between right and left, capital and labor.

Countercyclical policy, improved protection for labor, partial state ownership of some industries, active supply-side policy, enlarged welfare spending, indicative planning, the social market economy, short-term lending facilities through IMF were promoted in different countries as middle ways between LAISSEZ-FAIRE and central planning. In the COLD WAR era they did important political work in protecting Western societies from communism, and the success of post-war capitalism was in marked contrast to FINANCE CAPITALISM's dismal global record between WWI and WWII.

After the devastation of WWII, American manufacturing was in a globally dominant position. It was marked by large manufacturing plants built along FORDIST lines, with the automobile industry functioning as the paradigm. These factories were oriented towards mass production, top-down managerial control, and 'just in case' approach that demanded extra workers and inventories in case of surges in demand. The labor process was organized along TAYLORIST principles, which sought to break tasks down into smaller deskilled pieces and reorganized them in the most efficient way. The workers were gathered together in large numbers in large factories collectively represented by labor unions. Collective bargaining ensured that wages grew at a healthy pace with relatively permanent jobs, high wages, and guaranteed pensions. Meanwhile the welfare state redistributed money to those left outside the labor market.

Pre-World War II writings about management presumed managers to be completely in charge of the enterprise and knew it holistically from top to bottom, but needed to take their social duties more seriously, see how they were beholden to their fellow human beings, to society, and even more narrowly, to their customers. Most managers had worked their way through the firm, from the bottom up, as did Andrew Carnegie. This holistic style of thinking has re-emerged in the STAKEHOLDER THEORY of MANAGERIAL CAPITALISM, which sought to restore a balance between shareholders and those of the rest of the people and social institutions that interact through the firm's activities.

BIG LABOR was inducted into the system in the 1950's, with the GENERAL MOTORS formula for labor settlements. The industry price setter usually took the lead in union negotiations. Contracts would normally cover three years, and would include wage awards in line with forecasted productivity increases. Later, as inflation picked up, contracts included both the expected productivity increase plus biannual adjustments for inflation. But when productivity flattened out in the 1970's, and inflation accelerated at the same time, the companies were left with a cost problem they could not wish away.

Even contemporaries understood that the 1950's and early 1960's were something of a golden age. Most big companies became providers of pension and health benefits. For a large slice of the population, the American dream of a house with a lawn and a decent school for the kids came true. JOHN KENNETH GALBRAITH's THE AFFLUENT SOCIETY (Galbraith, 1960) in 1958 announced that the problem of production had been solved, and that it was time to focus on "expelling pain, tension, sorrow and the ubiquitous curse of ignorance".

Labor schools for Union activists flourished in the 1950s and 1960s. Most of them were run by Catholics, many at Jesuit colleges. The big industrial unions were often two-thirds Catholic. The schools taught bargaining and organization techniques, labor law, and labor economics, while extolling the "solidarist" power-sharing arrangements characteristic of Catholic Europe. Businessmen often attended the courses. Union leaders and executives began to regard themselves as industrial statesmen.

The stakeholder theory of MANAGERIAL CAPITALISM was more than a theory of how to run a company better. It had a far-reaching social and economic implications. In sharp contrasts to Milton Friedman and Michael Jensen who advocated strongly that a company succeeds simply through profit maximization, a stakeholder view emphasized the social relationships between management and employees, between the company and the community, the quality of the products produced and so on. These relationships gave the company social goals as well as financial ones. Together they can create more sustainable 'competitive advantage'. And because value is created collectively, through investments of resources by a multitude of actors, it should be also distributed more collectively, not just to the stockholders.

In contrast to stockholder value maximization and its goal of short-term profit maximization and its marginalization of human capital and research and development of ASSET MANAGER CAPITALISM, stakeholder values of MANAGERIAL CAPITALISM saw people not just as inputs but as essential contributors who need to be nurtured. Trust was then built between workers and managers, in a process that acknowledged the vital role of workers and managers in value creation. Investing in people was an admission that employees add value.

At the business schools, the reign of the big companies was taken as part of the natural order. The hot topics of the 1950s and 1960s were organization and finance, essentially rearranging furniture within the stable multi-unit enterprises of modern MANAGERIAL CAPITALISM. There was a 1960s merger movement, but it had academic, chalk-dust smell. The idea was that if companies assembled diverse portfolios of businesses, they could smooth out their earnings cycles. Absurdly, EXXON went into office equipment, bought a circus and a department store chain.

As business administration migrated to the graduate schools, executive ranks drifted farther from the shop floor. The consistent message of management textbooks from as late as the 1970s was that FORD, GENERAL MOTORS, and DuPont had written the sacred texts of production practices in the 1920s. The most important post war developments were mathematical techniques for optimizing machine maintenance and inventories. You could work on the formulas without going near a factory. Philip Mirowski in MACHINE DREAMS: ECONOMICS BECOMES A CYBORG SCIENCE (Mirowsky, 2002) traces the present-day predicaments of neoclassical economic theory to its intellectual reformulation and institutional restructuring at the COWLES COMMISSION and RAND CORPORATION by military funding and in the crucibles of WWII and the COLD WAR.

Philip Mirowski demonstrates that the mathematical economics of the postwar era was a complex response to the challenges of cyborg science, the attempt to unify the study of human beings and intelligent machines through JOHN VON NEUMAN's GENERAL THEORY OF AUTOMATA, and SIGMUND FREUD's PROSTHETHIC GOD. The dream of creating machines that can think has affected social sciences. He shows that what is conventionally thought to be 'history of technology' can be integrated with the history of economic ideas, focusing on the history of the computer. His analysis combines COLD WAR history with the history of the postwar economics in America, revealing that the PAX AMERICANA had much to do with the content of such abstruse and formal doctrines as linear programming and game theory.

Like flightless birds on a predator-free island, American companies had no defenses when hungry and hard-eyed competitors finally came hunting from overseas. It was a slaughter! By 1980, for all practical purposes America no longer manufactured televisions or radios, the Germans and Japanese controlled the machine tool industry, the American steel and textile industries were a catastrophe. Even IBM's mainframe computers were being challenged powerfully by AMDAHL and FUJITSU.

Spasmodic attempts to react to the foreign onslaught only revealed how incompetent American companies had become. During the years that Detroit was mesmerized by chrome-laden tailfins and theories of "planned obsolescence," companies like TOYOTA and VOLKSWAGEN introduced Americans to the advantages of small, well-made, fuel-efficient cars. Subcompact imports began to gain enough market share that FORD and CHEVROLET responded with small cars of their own, the PINTO and the VEGA, both introduced in 1970. When the oil price shocks hit in 1973 and small-car sales took off, the American entries were exposed as embarrassing duds. FORBES magazine later ranked them among the worst cars of all time.

8. The money illusion

In the 1960s, the FED encouraged US banks to step up credit creation, and more euro-dollars were created, and they spilled over as foreign investment. US companies undertook large purchases of European corporations - LE DEFI AMERICAIN. In 1971, when the French realized that American corporations bought up Europe with money created by American banks, they called the United States' bluff - $35:1 Troy ounce of 24K Gold. The French sent all those dollars that had been flooding into France, and demanded that they be converted into gold.

On August 15, 1971 the United States had to suspend the convertibility of dollars into gold. The fixed exchange rate system of BRETTON WOODS collapsed and the US dollar fell sharply on world markets, and the price of gold sky-rocketed. The reserve currency of the world officially became fiat money, no longer pegged to gold. The reserve currency of the world came to be created by private bank credit, debt, and eventually, derivatives securitized by debt, more derivatives securitized by securitized-debt. And banks traded and swapped a lot of bad debt among themselves behind closed doors assigning values to their trades as they see fit. In 2018, the nominal value of DERIVATIVES that TOO-BIG-TO-FAIL BANKS carry as assets on their balance sheets were staggering. The nominal value of all derivatives, according to BIS, stood at $639trillion.

In the 1980s, Japanese automobile manufacturing was the envy of the world. Having mastered a suite of production processes like just-in-time inventory systems, simultaneous engineering in which the design specifications of interdependent components are worked out concurrently

rather than consecutively, and mutual monitoring, Japanese firms like TOYOTA and HONDA had come to epitomize the concept of a modern lean corporation. TOYOTA, in particular, was held up to the world by management experts as a shining example of brutal efficiency cohabitating with creative flexibility. The industrial behemoth that produces TOYOTA cars and trucks is a group of roughly two hundred companies integrated by their common interest in supplying the TOYOTA itself with everything from electronic components to seat covers known as the TOYOTA PRODUCTION SYSTEM.

Companies in the group routinely exchanged personnel, shared intellectual property and assisted each other at the cost of their own time and resources, all without the requirement of formal contracts or detailed record keeping. Firms like TOYOTA that rely on networks of suppliers and subcontractors have to think of their partners' profitability rather than optimize their own short-term profitability. A network [the Japanese KEIRETSU] is a team effort, the art of building and maintaining relationships, ability to attract talent are important for network's sustainability as is its bottom line. Networks also experience a kind of inertia. Their evolution is path-dependent and often irreversible, so what happens in the early stages can be critical.

Network economics is very different from the orthodox economic theory's singular, overreaching, one-size-fits-all orthodox dogma. Unification, the search for a simple and all-encompassing theory, is the Holy Grail of science. But, the network theory suggests that in economics we need a plurality of theories for different contexts. The neoclassical theory's emphasis on competition only represents half of the story, because cooperation is not only essential for survival, but necessary for path determined existence.

According to Richard A. Werner's narrative in PRINCES OF THE YEN: JAPAN'S CENTRAL BANKERS AND THE TRANSFORMATION OF THE ECONOMY (Werner, 2018) and in NEW PARADIGM IN MACROECONOMICS: SOLVING THE RIDDLE OF JAPANESE MACROECONOMIC PERFORMANCE Werner, 2005) from the time of the MONGOLS' attempt to invade Japan in the 13th century through PERRY'S BLACK SHIPS to the PLAZA AGREEMENT, changes in Japan's economic, social, and political system have happened only three time in modern Japanese history during MEIJI PERIOD, in the late 19th century, and during WWII and Japan's defeat 74 years ago, and the 1989 crash and its longest and deepest recession that followed. In all three cases, crises triggered the change. And BoJ's reaction to PLAZA ACCORD triggered the last crisis.

The threat of colonization by foreign countries propelled the MEIJI REFORMS. THE GREAT DEPRESSION, the PACIFIC WAR, and the consequent defeat were the triggers for the second major mutation. The post war miracle of high growth was despite all its achievements, largely a quantitative change, one that took place within the unchanged economic and political institutions that had been put in place largely during WWII as an output-maximizing mobilized war economy. The third crisis was engineered by BoJ to implement PLAZA ACCORD's structural change agenda.

Once, when East was East and West was West, the chasm between them was not only geographical, but moral and historical too. ASIA was a term invented by Europeans to emphasize their own distinctiveness. To KIPLING-era imperialists, Asian societies were backward, despotic and unchanging. By contrast, Europe had made the decisive break to pursue a scientific approach to human affairs which justified Europe's domain over other continents. Condescension was met with emulation. Since Japan's MEIJI RESTORATION in 1868, Asia modernization was long a matter of copying the West, either out of admiration for Europeans or to repel them or both. Asia's economic transformations since the second world war were partly shaped by the needs of Western markets.

The US occupation, officially in charge until 1952, implemented the US program of reeducation and democratization of the Japanese people. It provided Japan with a new constitution, political parties, free elections also for women, a market-oriented capitalist economic system. MAC ARTHUR's reforms allowed labor unions, broke up the ZAIBATSU, and introduced sweeping land reforms. It was during the war that virtually all of the characteristics of the Japanese social, economic, and political system of postwar era that later came to be called the Japanese Miracle were formed.

US occupation purged the capitalist class, the owning families of ZAIBATSUs that mainly controlled their ZAIBATSU firms through holding companies which owned the majority of ZAIBATSU firms' stock. While the capitalist families disappeared from the economic landscape their large conglomerates remained and regrouped as KEIRETSU business groups. US occupation's other major change of the economic landscape was full-scale land reform that expropriated large-scale land and redistributed among peasants purging the land owning class. Having capitalist and land owning classes purged, the US occupation put KEIRETSU managers and government bureaucrats in charge of Japan.

Freed of profit maximizing capitalists and maximum rent demanding landlords, Japan's bureaucracy, thanks to US occupation, managed to realize its wartime fantasy of managing entirely free from the profit oriented interests of individual ownership. The wartime vision of managers not aiming at profits, but their own goals, had become entrenched reality. And managers' aims are advanced best when the firm grows – growth for the glory of the nation.

A mobilized MANAGERIAL CAPITALISM was established. Japan became a nation run by public and private bureaucrat-soldiers in the fight for economic supremacy. The stellar economic performance of Japan and the East Asian economies were not achieved through free markets, liberalization or deregulation policies advanced by neoclassical economics. As the WORLD BANK in 1993 recognized in its EAST ASIAN MIRACLE study, the EAST ASIAN success was due to government intervention in the form of clever institutional design and direct intervention in resource allocation especially in the credit markets. Ha-Joon Chang in GLOBALIZATION, ECONOMIC GROWTH AND THE ROLE OF THE STATE (Chang, 2003) and in greater detail in THE EAST ASIAN DEVELOPMENT: THE MIRACLE, THE CRISIS AND THE FUTURE (Chang, 2007) presents the historical data in the economic development model he advocates.

Until the end of the 1980s, the post war Japanese economic structure was characterized by restricted and incomplete capital markets, reliance of corporate finance on bank funding, weak stockholder influence, a large number of government regulations, direct government interference in the form of guidance, a large number of formal and informal cartels, inflexible labor markets offering full-time staff at large enterprises job security, promotion based on the seniority in terms of years spent with the firm and in-house company unions. Firms could afford to maintain cross stockholdings even if stock prices fell, because Japan was using German style book value accounting. Without pressure from stockholders, firms could plan for the long term and grow fast. Book value accounting had the additional benefit that it shielded companies from unnecessary volatility due to stock market movements and contributed to overall economic stability.

Japan, under American pressure, agreed to resolve growing trade surplus with the United States by pushing the yen higher with the PLAZA ACCORD of 1985. Dependent on America for security, Japan was constrained in its pushback. The PLAZA ACCORD also involved Britain, France, and West Germany. The countries announced that they wanted the dollar depreciate and intervened in currency markets to make it happen. Within a year the yen soared by nearly 50% against the dollar.

The PLAZA ACCORD is best understood not as a one-off event but as a critical stage in a multi-year dispute, which ranged from agriculture to electronics. America accused Japan of stealing intellectual property and plotting to control future industries. Robert Lighthizer, America's lead negotiator against China in 2019, gained his experience in Japanese-American negotiations. Back then Japan and Germany placated President Reagan's negotiators by agreeing to strengthen yen and D-mark against the dollar, making American goods a bit more competitive. Japan, in particular, was bullied into voluntarily restricting exports of from textiles to cars. More constructively, Japanese firms opened car factories in America, bringing Japanese quality management with them. But in 2019, the Chinese are not welcome to invest in America, where they stand accused of stealing technology and threatening national security. In 1990, Japan agreed to a STRUCTURAL IMPEDIMENTS INITIATIVE. America wanted Japan to improve its competition laws, open more widely to foreign investors and weaken its conglomerates, the KEIRETSU groups. Not very different from what President Trump wants from China.

ENDAKA, the strong yen, accompanied by the tight money policy of BoJ of the 1990s accelerated the shift of manufacturing units into Asia and promoted the opening up Japanese domestic economy to imports. The unprecedented shift of factories out of the Japan has virtually created a second Japan outside its borders. In financial year 1995, Japan produced more abroad than it exported from mainland Japan. ENDAKA, at the same time, boosted imports. A large part of imports was re-imports from Japanese factories that were offshored.

The PLAZA ACCORD set Japan on a path to doom. To counter the effect of strong yen, an obvious drag on exports, Japan slashed interest rates and unleashed fiscal stimulus. These moves brought about a short lived economic rebound. But they also generated asset bubbles. Stock and land prices tripled within five years after the PLAZA ACCORD. These bubbles burst and the economy slumped, never to recover its former mojo. In nominal terms Japanese stocks are, in 2019, 40% below their peak on the final official trading day of 1989. The PLAZA ACCORD did succeed in defusing tensions between the second largest economy, Japan, and America by neutering Japan as a challenger. How America dealt with LE DEFI JAPONAIS has percolated

into thinking in China.

The sequence of Japan's woes does seem to make for damning indictment. But a close look at each step shows that they were not preordained. One point, clear in retrospect, is that under American pressure without European support Japan overcompensated for the slowdown in exports. Within 18 months of the PLAZA ACCORD, BoJ had cut benchmark interest rates from 5% to 2.5%. It also announced a big stimulus package, increasing government spending and cutting taxes in May 1987, though by then its recovery was already under way. It did not shift gears and raise rates again until 1989, when its asset bubbles were already a few years old.

There were at least two other factors that could have led to a different outcome. Excessive stimulus, by itself, did not guarantee that Japan would suffer an asset bubble. But, BoJ's credit expansion became much more effective when it was combined with financial deregulation, which led banks to lend more to property developers and home buyers. Guided cheap credit expansion is the recipe to inflate bubbles. GREENSPAN must have taken notice.

The bursting of the double bubbles did not guarantee that Japan would suffer a lost decade, let alone three. A confusingly sluggish response by regulators compounded the trouble. Rather than pushing banks to raise capital as post 2008 Western regulators did, they encouraged them to go on lending to zombie firms, perhaps to share to costs of the double real and financial assets' crashes.

The domestic economy changed after the offshoring of factories and the influx of manufactured goods. In order to compete with rising imports, firms had to lower prices, reduce inefficiencies, and increase productivity. Employment practices had to change and consumer preferences had to be taken more seriously. In April 1995, double crisis of economic slump and the shock of yen at 80 yen to a dollar convinced even the conservatives that Japan had to deregulate. All the barriers against foreign firms came down. As Japan shifted its economic system to ASSET MANAGER CAPIITALISM, the center of the economy moved from main-banks to stock markets. Since mid-1994, the Japanese service sector employed more people than the manufacturing sector.

Japanese MANAGERIAL CAPITALISM without capitalists had become increasingly embattled during the 1990s. The collapse of stock market bubble ensuing the credit crunch engineered by BoJ forced many companies to sell off cross stockholdings that had been created during the war, ZIBATSUs and in the postwar era, KEIRETSUs. NIKKEI 225 index closing at a twenty-year low on the last day of 2002 provided foreign investors with the opportunity to buy the ownership of Japanese companies. In March 1999, the share of stocks listed on the TOKYO STOCK EXCHANGE that were owned by foreigners reached a postwar record high of 14.1%. By March 2001, it had risen to 18.3%, a long way above the 2.8% recorded in 1978.

Mark-to-market accounting was adopted by the Ministry of Finance in 2001 speeding the transformation away from the corporate governance of MANAGERIAL CAPITAISM to corporate governance of ASSET MANAGER CAPITALISM. By 2005, the corporate governance landscape was reshaped, making main-bank system history. KEIRETSU's cross stockholdings have become exception, not the rule, it was before the crash. As a result, accountability to shareholders became a reality for the first time since the 1920s. Corporate management became increasingly profit oriented and companies are run for stockholders' wealth maximization not managers' and employees' income maximization.

In other EAST ASIAN countries there were close similarities, some were put in place already under Japanese colonial rule. The phenomenal growth of the Chinese economy since 1980 has also occurred without the benefits of the free market model of neoclassical economics.

The main reason why the extraordinary nature of Japan's MANAGERIAL CAPITALISM has remained unknown in the MBA programs for so long is the a-historic and usually counterfactual approach of neoclassical economic theory. History provides data set for the scientific economists to study. Ignoring history means neglecting the facts. The peacetime war economy of Japan's MANAGERIAL CAPITALISM was highly successful, actually by many measurements the most in the world. In the 1950s and 1960s, Japan expanded continuously at double-digit growth rates. From 1960 to 1970, Japan's real GDP rose from 71.6trillion yen to 188.3trillion – up 2.6 times. Japan overtook Germany to become the second economic power in the world reducing the world's and especially American tolerance of Japan's highly successful economic system.

After 20 years of almost continuous double-digit growth, the real GDP growth suddenly contracted in 1974. The recession lasted longer and was more severe than had been anticipated. The necessary and sufficient condition for economic recovery was an increase in credit growth. Many studies concluded that Japan would not be able to maintain the historical growth rates mainly based on exports. It would have to revamp its economy. Thus, the events of the 1970s were more than a wake-up call and a test run for BANK OF JAPAN.

It cannot be denied that BoJ had gained valuable experience in the mechanics of the creation and propagation of a real estate based credit boom and the collapse that must follow. To cope with the aftermath of 8/15/1971 NIXON's unilateral decision that ended the BRETTON WOODS fixed exchange regime, BoJ bought a lot of yen and domestic financial assets with the newly created money. Already flush in liquidity for productive projects, the firms used the increased bank loans to embark on speculative land purchases. Urban land prices jumped by more than 50% from 1972 to 1974. BoJ induced credit boom was large enough to spill over from asset markets to real economy. All this happened before the oil shock of November 1973.

From mid-1980s until the end of the decade, Japanese foreign investments dominated international capital flows. Japanese long-term capital flows multiplied from a net inflow of more than $2billion in 1980 to an outflow of nearly $10billion in 1981 to reach $65billion in 1985, $132billion in 1986, and $137billion in 1987. Japan was purchasing far more assets abroad than it could afford due to its exports. To fund its international shopping spree in the 1980s, Japan actually had to borrow foreign currency. Japan created new hot money and then bought up the world. Despite the enormous capital outflow, the yen did not weaken. To the contrary, it rose 106% from 1985 to 1987. And in the West, management gurus urged business leaders to adopt Japanese techniques as the last resort to withstand LE DEFI JAPONAIS.

Japan pulled off the same strategy corporate America used in the 1950s and 1960s, when US banks excessively created dollars, Eurodollars. Corporate America used Eurodollars, hot money of the day, to buy up European companies. While the United States had the cover of the dollar standard,[$35:1 Troy ounce of 24karat gold] Japan's cover was its significant trade surpluses, which was enough to convince observers that the yen had to be strong. As the yen did not weaken, the world suffered from the biggest bout of illusion on record. The great yen illusion.

Approximately 40% of the cumulative value of Japanese overseas investments were wiped out in yen terms between January of 1985 and January of 1987. Despite the losses, Japanese investors continued to invest in sizable amounts in US and other foreign assets. This anomaly persisted over several years despite the fact that the intention of the PLAZA ACCORD – namely to strengthen the yen – was not in doubt. In 1991, as Japanese current account was heading for new record surpluses, topping $90billion, net long-term capital outflows had suddenly vanished. Japan remained a net seller of foreign assets throughout 1991. With increasing losses on their foreign investments, it had become apparent that Japanese corporations, and particular the country's financial institutions, had not invested to make profits.

The crisis of 1990 has spelled the end of Japanese miracle model. Japan in the 21st century is again in the process of switching to a fundamentally different form of economic organization, namely, an ASSET MANAGER CAPITALISM. Few were and are aware of the fact that in 1920s Japan's economy in many ways looked a lot more like pre-GREAT DEPRESSION US economy, FINANCIAL CAPITALISM.

Transformation of Japan's economic system was no small undertaking. The war economy system internally consistent and permeated all sectors and levels of the economy and even society. It had shaped the labor market, the capital market, the corporate governance structure, the legal system and the behavior of firms, government bureaucrats, and politicians as ordinary people. To change Japan, it seemed, one need to change everything. Only if one abandoned all features of the old system would it be possible to create a different economic structure. The Japanese needed to be made conscious of the need for such a historically unprecedented transformation. They needed an unprecedented peace time crisis. Two asset bubbles and their bust. BoJ delivered them all.

9. Financialization in the age of baby boom

The complacent incompetence of American business was bad enough, but with the demographic tides they were a double whammy. Ask an economist about the 1970's plunge in American productivity, and he will point to the fall off in investment. Possibly, some executives were slothful and incompetent, but rising inflation and interest rates made capital very expensive. On the other hand, a demographer would point to an upsurge in young workers. People in the BABY BOOM GENERATION entered their twenties in the 1970s, creating downward pressure on wages. "When workers are cheap and capital expensive, it is sensible to reduce investment." claimed orthodox economists, but the Chinese mandarins disagreed and

achieved highest growth rates per annum for their economy by investing more than half of their GDP in most years in the last two decades of the 20th century. So great was the overhang of Chinese mandarins' investment strategy in manufacturing sector that by the second decade of the 21st century Chinese companies' prices have become global prices.

The baby boom illustrates the impact of marginal changes in a population cohort. Eighteen-to twenty-four-year-olds were 4.3% of the population in 1960, and 5.6% of the population in 1970, which looks like only modest change. But the total numbers of eighteen-to twenty-four-year-olds jumped by about 50%, from 7.6 million to 11.4 million, and that was utterly disruptive.

Richard A. Easterlin (2004), who wrote one of the earliest and thorough analyses of the boomer phenomena, emphasized the size of a birth cohort compared to the one just before. Birth rates dropped sharply during the Depression years, so the generation of men entering the labor market in the 1950s was an unusually small one and was much in demand. The pay gap between young workers and older workers, therefore became unusually narrow, facilitating early marriage and greater economic security also made couples more willing to have children. In Easterlin's formulation, the cohort changes became self-amplifying.

Sometime in the mid-1950s, however, the amplifying mechanisms began tilting toward disruption. When the boomers reached school age, elementary schools everywhere were forced onto double and triple sessions. It was even worse in the suburbs, where schools had to be built from scratch. As they hit their teens, juvenile delinquency moved to the top of the social agenda. Struggling to cope, police forces became more selective about the behaviors that elicited an intervention, a process that Daniel Patrick Moynihan later called "defining deviance down."

When REAGAN took office in 1981 and PAUL VOLCKER launched his assault on inflation, the great American industrial firms built during the halcyon years from the 1940 to 1960s were already intrinsically vulnerable. MONETARISM would in effect, blow them apart, for the double digit interest rates VOLCKER and REAGAN brought on in 1981 had three catastrophic effects on these sectors. First, it destroyed their export markets, sending economies in Latin America, Africa, and parts of Asia into a tailspin from which they could not recover, in some cases, for twenty years. Second, the recession destroyed, though more briefly, their home markets. Thirdly, the interest rates drove up the value of the dollar, by around 60% in relation to the U.S. trading partners.

Those who could still purchase equipment could get it at lower price from Japan or Germany, from KOMATSU or SIEMENS rather than CATERPILLAR or INTERNATIONAL HARVESTER or ALLIS-CHALMERS. The great American Industrial belt and the labor unions it housed were kicked to pieces. And the process of dismantling of the institutions of the NEW DEAL began in the United States.

By the midpoint of the Reagan era, many large corporations had been bankrupted by high interest rates, the ensuing recession in 1981 and 1982, and the competitive boost that the high dollar gave to competing industries in Japan and Europe. A major reorganization of the most technologically advanced sectors took place. Technology wizards left the large integrated companies to form their own start-ups in Silicon Valley and Seattle. In the 1990s and after, what remained of some of America's once great industrial and technical firms would fall victim to new waves of financial fraud. Plainly, the great American corporation was neither permanent nor invincible. Many that taught at business schools in early 1980s in America basically decided to pretend that the demise of large corporations had its roots in bad macro management and government's regulatory interferences with the market.

"Government was the cause", President REAGAN assured "not the corporations' market power". The business school mantra asserted that the presence of the Japanese and Germans on the world stage meant that there was competition after all without specifying the two systems' different structures and macro policies. Power dispersed in several directions. Some of it went to technologists, as they set off to California and Washington to establish their own independent companies, transforming the large integrated enterprises from producers to consumers of scientific and technical research. Some of it went to asset managers of hedge funds and private equity groups concentrated in Manhattan and London, who came to reassert their own standards of financial performance on large companies, at the risk of a disciplinary raid and hostile acquisition. Some of it was lost overseas, to the encroaching enterprises of Europe and Japan. Some of it devolved unto members of the chief executive class, previously subordinate in practice to the techno-structure.

These four phenomena, the rise of international trade, the reassertion of financial power, the outsourcing of technological development, and the ascendance of an oligarchy in the executive class that coupled with REAGAN's and THATCHER's deregulations over the last two decades of the twentieth century had dramatic effects on American corporations, on the way they are run and on their broadly declining position in the world.

The decline of national industrial corporations in the United States can be seen in part as a process of dispersion of the techno-structure's power. This occurred partly in response to growing global competition, partly following a countercoup of asset managers from the world of international finance, partly in response to a change in the organization of technology, and partly as the result of the rise of a class of oligarchs, the new CEO's who became once again an autonomous force in the life of companies they oversaw.

The high interest rates of the 1980s, cost of funds, became a predominant consideration for the survival of the enterprise. REAGAN's monetarism thus made the industrial firm dependent on its source of finance. It re-established the preeminent power of financial institutions in the United States. Wall Street was put back in charge. Mutual funds sprang up, allowing ordinary baby boomers to pool resources and have access to "professional" investment managers. A constant stream of money from pension contributions and shift of savings from bank accounts to mutual funds helped investment markets to grow. A modern fund management was born, ASSET MANAGER CAPITALISM. Insurance companies reengineered themselves into wealth managers. QUANTITATIVE FINANCE was born with four key principles for fund management. Harry Markowitz's DIVERSIFICATION, Eugene Fama's EFFICIENT MARKETS, MEAN/VARIANCE which estimated risk as standard deviation or variance as measure of volatility, and William Sharpe's CAPITAL ASSETS' PRICING MODEL that concluded: "if you took more risk then you needed higher returns." Old time investors cried with joy. They had been doing CAPMs without knowing it.

CAPM assumes that all investors hold portfolios of stocks that optimize the trade-off between risks and returns. If everyone in the market owns such portfolios, they can then be combined to create market portfolio. The risk of an individual stock is then measured relative to the theoretical market portfolio. Thus risk factor, known as beta, is then used to calculate the cost of equity, or the return that stockholders need to receive to make the risk worthwhile. The problem is that implementing CAPM is virtually impossible, because the theory assumes perfect information on company risk, an unlimited ability to sell stocks short, and the same time horizon for all investors. In addition, because risk and return profiles change, the market portfolio must be continuously upgraded which in reality involve significant transaction costs. The asset managers tend to be evaluated against S&P 500 or FTSE 100. Furthermore, evidence shows that asset managers 'chase returns' rather than optimize risk-return trade-offs in the CAPM assumes.

The assumption that the market behaves like a collection of independent, perfectly informed individuals was originally adopted in order to aid computation, but has turned out to be a persistent feature of orthodox economics. In 1965, 100 years after Jevons wrote his THEORY OF POLITICAL ECONOMY, Eugene Fama presented the EFFICIENT MARKET HYPOTHESIS. Echoing JEVONS, FAMA imagined a market where there are a large numbers of rational profit maximizers actively competing, with each trying to predict future market values of individual securities and where important current information is almost freely available to all participants.

FAMA's hypothesis was that such a market would efficiently allocate resources, and allocate financial risks towards economic entities that are most able to bear them. The efficient market hypothesis also states that market mechanisms tend to self-correct and eliminate any disequilibrium such as bubbles or crashes. FAMA's hypothesis has been at the core of financial regulation over the past 40 years. The 2005 BASEL ACCORD of BANK OF INTERNATIONAL SETTLEMENT emphasized market discipline and self-regulation of large banks as core pillars of international financial regulation, and still does when many regard the EFFICIENT MARKET HYPOTHESIS as a myth born of NEWTONIAN theories of equilibrium and BACHELIER's random walk.

Orthodox economics assumes the market is made up of free individuals, who interact only to maximize their own utility, and that the economy can be modelled by aggregating over these individuals. Network theory, on the other hand, instead of seeing a group of people as nothing but a collection of individuals that act independently of one another, focuses on relationships between them. By analyzing the dynamics that occur during a period of relative economic stability, we will try to understand why and how market forces actually lead to financial instability rather than equilibrium that efficient market hypothesis professes.

Since the 19th century, the economy had been viewed as an essentially static system, which when perturbed from the outside by external events, automatically self-adjusted to get back to its optimal equilibrium. Of

course there is a constant supply of news to be assimilated, so the market never quite settles, but at any single moment it is nearly in a state of perfect balance. Since news is random and unexpected, it follows that price fluctuations, too, should be random – like the toss of a dice, or a draw from a pack of cards. One could not say whether its next move would be up or down for sure. However, as LOUIS BACHELIER argued in his 1900 dissertation THEORIE DE LA SPECULATION, the market's behavior was essentially random and it was "impossible to hope for mathematical forecasting" although it was still possible to calculate the odds using the laws of chance. If one assumed price changes were the result of many independent fluctuations, each with the same probability distribution, then they should follow the familiar normal, or bell-curve, distribution.

Mathematicians and physicists had already constructed sophisticated techniques for dealing with randomness. Application of these methods became known as ZAITEKU in Japan FINANCIAL ENGINEERING in the West. The reason we cannot predict the economy not because the market is irrational, but because it is too rational, FAMA argued. FAMA and BACHELIER seemingly argued for very similar conclusions. Their difference was that BACHELIER, 65 years earlier, saw the market as impenetrable to reason, while FAMA saw it as being itself the reason. The market was the sum total of "many intelligent participants", so its collective wisdom was greater than that of any one person. FAMA's thesis was based on empirical evidence, which showed that economic forecasters were consistently unable to predict market movements.

Benoit Mandelbrot in FRACTALS AND SCALING IN FINANCE: DISCONTINUITY, CONCENTRATION, RISK (Mandelbrot, 1997) and in THE [MIS]BEHAVIOR OF MARKET: A FRACTAL VIEW OF RISK, RUIN, AND REWARD (Mandelbrot, 2004) with R. I. Hudson in four strokes falsified the random-walk hypothesis. 1. There were more extreme price swings than random walk would predict because the data had much fatter tails than a bell-shaped curve had. 2. The extreme events were in fact quite extreme; large proportion of the total variance was explained by just a few violent price movements. 3. There appeared to be some clustering of price movements in time, a pattern punctuated equilibrium. 4. The statistics describing the data were not stationary as the random walk predicted, but changed over time. Not only did MANDELBROT falsified the random walk hypothesis, but he also proposed an alternative. Power law neatly explained the fat tails and extreme volatility of price movements that EFFICIENT MARKET HYPOTHESIS could not explain. MANDELBROT described the market prices as having fractal geometry.

Rational economic man reached his highest state of perfection with THE RATIONAL EXPECTATIONS THEORY of ROBERT LUCAS. This assumed not only that market participants were rational but also that they had a perfect model of the economy in their head, in the sense that they did not make systematic errors. As with the efficient market hypothesis, the theory assumed that markets were at static equilibrium. If prices were too high or too low that would imply that people were not rational. RATIONAL EXPECTATIONS does not imply that agents never make mistakes. Agents may make mistakes on occasion. But these mistakes are only random, so each agent is correct on average over time, and, at each point in time the aggregate decisions of a large pool of agents are rational.

In technical terms LUCAS defined expectations as the mean of a distribution of a random variable. As the number of observations increases, the distribution resembles a bell curve, a normal distribution, and the expectation coincides with the peak of the curve, the average of the observations. Similarly, the error or random events causing these errors adhere to the bell-shaped distribution, but their mean/expectation is zero. RATIONAL EXPECTATIONS HYPOTHESIS assumes that agents are rational and equipped with the same information and preferences, and treats the economy as the outcome of the decisions of only one individual, the REPRESENTATIVE AGENT. Agents who are identical in terms of their rationality, information sets and preferences will take identical decisions. So analyzing their decisions as a group is equivalent to analyzing their independent decisions. Therefore, mathematically, instead of maximizing the sum utility functions, you just have to maximize one utility function.

The idea of rational behavior was also given a credibility boost in the 1970s by Richard Dawkins, who provided a link between genetics and natural selection. As he wrote in THE SELFISH GENE (Dawkins, 1989), "If you look at the way natural selection works, it seems to follow that anything that has evolved by natural selection should be selfish." We are rational, utility maximizing machines because our genes are. An implication of this was that economic success reflected superior genes. This is the core concept of "a chicken is just an egg's way of making another egg" – the organism is just a vehicle for the genome to be replicated in the next generation, and behavior is just this wispy epiphenomenon that facilitates the replication.

This gene-centered view can be divided in two. One is that the genome [i.e., collection of all the genes, regulatory elements, and so on] is the best level to think about things. The more radical view held by Dawkins, is that the most appropriate level is that of individual genes – [i.e., selfish genes], rather than selfish genomes. Moreover, most evolution historically took place in microorganisms and has involved a process called endosymbiosis, in which species exchange components or come together to form new species. Furthermore, biological systems have a remarkable capacity for self-organization in which highly organized can emerge without any planning or selection. Complexity scientists see patterns of nature emerging from internal dynamics, rather than just natural selection. Dawkins emphasis on mutations and the survival of the fittest is consistent with the idea, going back to Democritus, that the world is determined by the random shuffling of the atoms. "Everything existing in the universe is the fruit of chance and necessity." But the random mutation and selection are clearly important drivers of evolution that does not grant them exclusivity. The difference between the mainstream reductionist approach and the complexity approach is revealing.

Kate Raworth in DOUGHNUT ECONOMICS: 7 WAYS TO THINK LIKE A 21ST CENTURY ECONOMIST (Raworth, 2017) calls for replacement of HOMO ECONOMICUS with more complex portrait of human behavior: First, rather than narrowly self-interested, we are social and reciprocating. Second, in place of fixed preferences, we have fluid values. Third instead of isolated, we are interdependent. Fourth, rather than calculate, we usually approximate. Fifth, far from having dominion over nature, we are deeply embedded in the web of life. The appropriate framework for sketching this portrait in mathematical terms seems to be quantum formalism.

The main problem with EFFICIENT MARKET HYPOTHESIS is the notion of "intrinsic value". The theory was born out of the neoclassical belief that the economy has some kind of stable equilibrium – a unique set of prices that perfectly matches buyers and sellers. For a dynamic system such as the economy, there is no requirement that an equilibrium point even exist. The stable point was a mathematical convenience, modeled by 19th century economists after the physics of their time. Viewed in this way, it seems bizarre that unpredictability could somehow be taken as a sign of efficiency and rationality. The reason investors cannot accurately predict fluctuations in the price of gold is not because they cannot determine the substance's intrinsic value. It is because intrinsic value does not exist. The price of an asset reflects the market's consensus about its future value, which is highly variable and prone to all sorts of forces, including irrational ones.

One area where advanced mathematical techniques have been enthusiastically adopted is the proprietary statistical algorithms used by quantitative traders who are often mathematicians or physicists by training at banks and hedge funds. Analysts scour financial data for subtle but persistent patterns for a while that, according to efficient market theory, should not exist, and use them to devise trading strategies. Thriving through leverage and arbitrage, fast trading and risk shuffling, the traders in the major banks have long had access to virtually unlimited funds at near-zero interest rates after 2008 crisis, while the TREASURY and FED anointed most of them as TOO-BIG-TO-FAIL.

In effect the federal government, through FED and scores of other regulators, has socialized the downside of these institutions, enabling them to carry on what they call CREATIVE RISK TAKING. With zero-interest money from FED, the TOO-BIG-TO-FAIL banks bought trillions of dollars' worth of government bonds, and expropriated the spread. Zero interest rates resulted in easy money for highly leveraged WALL STREET speculators, cheap money for the government, but a barren credit landscape for entrepreneurial small businesses. Some 2,600 community banks went out of business. It seemed they were TOO-SMALL-TO-BAIL.

Although EFFICIENT MARKET HYPOTHESIS may not be good science, financial markets are evolutionary systems. Markets are social technology devised for integrating the views of large numbers of people to put prices on complex assets, and allocate capital, not to best use at times and very expensively. The competitive intensity of markets ensures that they are fast at processing information, and that there is pressure on their participants to continuously innovate. Andrew Lo in ADAPTIVE MARKETS: FINANCIAL EVOLUTION AT THE SPEED OF THOUGHT (Lo, 2017) calls the evolutionary effectiveness of markets ADAPTIVE MARKET HYPOTHESIS and argues that the theory of market efficiency is not wrong, but incomplete. Andrew Lo's paradigm explains how financial evolution shapes behavior and markets at the speed of thought revealed by swings of stability and crisis, profits and loss, and innovation and regulation.

The genius of EFFICIENT MARKET HYPOTHESIS was the way it co-opted the mantras of economic theory, "efficiency" and "rational", to free markets. The equations showed why free markets were so good at setting prices and creating wealth. They also rationalized away problems such as the unequal distribution of riches. Because the markets were rational and

efficient, it followed that everything companies or individuals did was in the best interest of society, even if it did not look that way. Anything that impeded its workings, such as government regulation or unions or anti-globalization movements, was by definition inefficient and irrational. But the EFFICIENT MARKET HYPOTHESIS only predicts that we cannot predict, thus providing a convenient explanation for missed forecasts like the 2008 FINANCIAL CRISIS.

In 1974, PAUL SAMUELSON canonized FAMA's EFFICIENT MARKET HYPOTHESIS by suggesting that most stock-pickers should go out of business, for even the best of them could not always beat the market average. In line with his suggestions, the following year, VANGUARD launched an index fund for retail investors. It was not eagerly received, only raising $17million by 1980. WALL STREET propaganda machine denounced it "un-American". Index investing has prospered lately in the last two decades. Index funds have grown around 6 times faster than those managed by active fund managers who select stocks to buy and sell. Many investors get the average stock market returns for a fee of .03%.

SAMUELSON's case for an indexed fund is grounded in the idea that stock markets are "efficient". Any relevant news about a company's prospects is quickly reflected in its stock price. If there were obvious bargains, a little effort would reward the attentive at the expense of slothful investors. But, if more people are buying the index, might it become "deficient"? And might that, in turn, create opportunities for the very stock-pickers who SAMUELSON suggested should cease trading? In fact, the opposite is more likely. If index investing has displaced bad stock-pickers, it will have made the market more "efficient", not less.

The whole is the sum of its part, a tautology, is essential to an understanding of why this is so. With index investing the average investor can do as well as the stock market average. For some investors to beat the market, others must be beaten by it. Stock-pickers go to great pains to gather facts, to assess them and to trade them. In spite of the fact that the performance of most mutual funds does not justify these costs, the turnover of stocks has actually increased over time. Active investors are more active than ever. Another supportive observation of financialization.

The result, much applauded in business schools, was the rise of "stockholders' wealth maximization" as raison d'etre of corporations, and "short termism" as the emergent phenomena, at the top of the corporation. Financial targets were set and had to be met, whatever their implications for the long term viability of the enterprise. A company that failed to do so could be punished by a declining stock price and, ultimately, the discipline of a hostile takeover, followed by aggressive disruption of the techno-structure. The situation greatly favored the emergence of firms that, unlike the integrated industrial behemoths of the 1950s and 1960s, were purely focused on advanced technology. It is no surprise that high technology elements tended to separate from the large corporation, leading to the emergence of a separate technology sector in the 1990s, the platform company.

Most CEOs are criticized for being slaves to short-term profit targets. Yet few flout the orthodoxy in flamboyant fashion. Consider TESLA, a maker of electric cars. By September in 2017, it missed its production targets and lost $1.86billion of its free cash flow, the money firms generate after capital investment has been subtracted. No matter. When Elon Musk, its founder, muses aloud about driverless cars, space travel, TESLA's stocks rise. 66% since January to October 2017. AMAZON lost $4billion between 2012 and 2014 without being punished by the stock markets. Only 25, or 3.3%, of the Russell 1000 index of large American firms lost over $1billion free cash flow in 2016. In 2007 the share was 1.4%, and in 1997, under 1%. In 2017, NETFLIX and UBER are the other billion-dollar losing tech companies that claim their, so far unproven business models, will transform industries, the other $billion losers were energy companies in the doldrums as they adjusted to the plunge in oil prices. CHESAPEAKE ENERGY has lost at least $1billion of free cash flow a year for 14 years in a row. NEXTERA ENERGY managed 12 rears on the trot. Collectively, TESLA, UBER, NETFLIX, CHESAPEAKE ENERGY and NEXTERA ENERGY have burned $100billion in the past decade, yet they boast a total market value of about $300billion.

DuPont, on the other hand, grew from a start-up gunpowder maker in 1802 to a major global chemicals, materials and life sciences company that has endured for over 2 centuries with more than 60,000 employees in 2005 and $27billion in revenue underperformed the broad market indices for much of its history. DuPont's management's focus had been on the endurance of the firm, not on short-term stockholders' wealth. APPLE Inc. is different. In the spring of 2013, Tim Cooks, the company's CEO decided to borrow $17billion, when it already had $145billion sitting in the banks outside of the US, with another $3billion in profits in every month, for buy-backs to goose the company's lagging stock price. The tactic worked. The stock soared, making APPLE the biggest according to market capitalization and yielding hundreds of millions of dollars in paper wealth for APPLE' board members who approved the tactic and for the company's stockholders of whom Tim Cook is one of the largest. APPLE seemed to have applied same level of creativity in financially engineering its balance sheet as it did engineering its products.

One of the quandaries of the last three decades has been the way in which reductions in spending on research and development have coincided with an increasing financialization of the private sector. While causality may be hard to ascertain that will meet Judea Pearl and Dana Mackenzie's expectation they explain in THE BOOK OF WHY: THE NEW SCIENCE OF CAUSE AND EFFECT (Pearl and Mackenzie, 2018) , it cannot be denied that at the same time that private pharma companies have been reducing their research and development budgets, they have been increasing the amount of funds used to repurchase their own stocks, seemingly to boost their stock price, which affects the price of stock options and executive pay linked to such options. In 2011, along with $6.2billion paid in dividends, PFIZER repurchased $9billion in stock, equivalent to 90% of its net income and 99% of its research and development expenditures. AMGEN, the biggest biopharma company, has repurchased stock every year since 1992, for a total of $4.2billion through 2001, including $8.3billion in 2011. Since 2002 the cost of AMGEN's stock repurchases has surpassed the company's research and development expenditures every year except 2004, and for the period 1992-2011 it was equal to fully 115% of research and development outlays and 113% of net income (The Economist, 2018). Boosting stock prices does not create value, but facilitates extraction, rewarding stockholders and executives. The problem of stock buybacks is not isolated but rampant. In the last decade, S&P 500 companies have spent $3trillion on buybacks.

William Lazonick in SUSTAINABLE PROSPERITY IN THE NEW ECONOMY: BUSINESS ORGANIZATION AND THE HIGH-TECH EMPLOYMENT IN THE UNITED STATES (Lazonick, 2009) chronicling stock buyback identifies two trends, when taken together, as a shift from a model of 'Retain and Invest" to "Downsize and Distribute". "Retain and Invest" strategy uses finance only to set up a company and start production. Once profits are being made loans are likely to be at least partly repaid because retained earnings are a cheap way of financing the next production cycle and investments to expand market share. "Downsize and Distribute" is different. It views companies merely as "cash cows" whose least productive branches have to be sold. The resulting revenue then distributed to managers and stockholders, rather than to others such as workers who have also contributed and are contributing to the business. The results may hamper the growth of the company. If the stockholders are happy, however, the strategy is justified.

Perversely it was the conservative Japanese who took trading within corporations to a new level. They were slavish lovers of American management theory. They had used the work of FREDERICK TAYLOR and EDWARD DEMING to revolutionize manufacturing. TOTAL QUALITY MANAGEMENT, JUST-IN-TIME and ZERO DEFECT. They would do the same with financial management. This was ZAITEC or ZAITEKU, financial engineering. The treasury, the financial function within companies, was to be a profit center. ZAITEKU meant trading in financial instruments to earn revenues for the company. Banks used corporate business to trade and make profits so corporations could use their own flows to make money as well. In management jargon, it was "internalization".

Japanese corporations embraced ZAITEKU with a passion. Following the PLAZA ACCORD in 1985, the yen appreciated, creating havoc among Japanese exporters who had come to rely on the cheap currency. The shift meant that these exporters had to change strategy, which in most cases meant moving production facilities offshore. Unfortunately, one cannot move a car plant to Ohio overnight. Japanese companies tried to use ZAITEKU to generate earnings to cover up the weak profitability of the main businesses. Japanese corporations traded foreign exchange, bonds, commodities, and even equities. Derivatives with their leverage and off-balance sheet nature, were ideal.

In 1967 Sheen Kassouf and Edward O. Thorp in BEAT THE MARKET: A SCIENTIFIC STOCK MARKET SYSTEM (Kassouf and Thorp, 1967) explained how to price convertible bonds which are hybrid securities made up of a bond, which pays a regular interest payment, and those thinly traded warrants, which give the owner the right to convert the security to stock [hence the name of the bonds]. Pricing a warrant was a difficult task, since its value depends on forecasting the likely price of the underlying stock at some future date. The system THORP and KASSOUF devised helped them make predictions about the future course of stock prices, and enabling them to discover which convertible bonds were mispriced. The future movement of a stock, a variable known as "volatility" is random, and therefore quantifiable. And if the warrant is priced in a way that underestimates, or overestimates,

from its likely volatility, money can be made. THORP and KASSOUF were the first to devise a quantitative method to discover valuation metrics for warrants, as well as correlations between how much stock investors should hold to hedge their position in those warrants. Over time, this way of arbitraging came to be called DELTA HEDGING.

The most famous form of ZAITEKU was the "Japanese warrants arbitrage". Japanese companies issued bonds with attached equity warrants. The warrants gave the buyer the right to buy shares in the company, effectively a call option on the shares. The company received the premium for the option as a low interest rate on its borrowing. The Japanese companies competed with each other to get lower interest rates. Dealers competed with each other to give the Japanese companies lower interest rates. The coupon on the bond reached zero and in some cases the cost of the debt was negative. The companies invested the borrowed money in matching bonds, locking in the difference between the interest they received and the interest they paid, if they paid any at all. The companies booked the difference as profit. Under Japanese accounting rules, the shares to be issued if warrants were exercised did not seem to be taken into account.

Companies invested in bonds that they or other companies issued as part of the debt plus equity warrants issue. The warrants were stripped off and placed with someone, leaving only the bond. The warrant buyer paid a hefty premium to punt on Japanese stock markets going up. In 1980s the NIKKEI only went up. The premium allowed the holder of the bond to earn a decent rate of interest. This was all done with the magic of derivatives, an asset swap.

The company issued bonds with warrants at almost no interest cost, then they invested the proceeds in the same or near-identical bonds at higher rates to lock in profits. The dealers did not care. They were making money going in and coming out. In 1989, the Japanese bubble burst. Japanese companies reported losses, some totaling, billions of dollars. It was not fashionable any more to have treasuries as profit centers in Japanese corporations.

NIKKEI, after reaching a high of more than 39,000 in 1989, took a nosedive and everything else followed. Few warrants were ever exercised. The Japanese companies had sold the call options on their own stock at the top of the market and banked profits. The warrant buyers were the losers. In a perverse twist, the American and European companies, having exported ZAITEKU to Japan, began feverishly to copy it.

Without heeding the lessons of how ZAITEKU's application ended in Japan, academics and commentators eulogized financial engineering as the revolutionary new thing, and some still do even after the 2008 financial crisis.

In ASSET MANAGER CAPITALISM that developed in the United States on the other hand, for those with exceptional imagination, scientific talent, quantitative wizardry, or just skills to persuade venture finance that they possess these traits, the prospects and outcomes were spectacular. They could raise huge sums, pay themselves well, and start new companies in a hurry. There emerged a new business elite: young, mysteriously knowledgeable, independent, and fabulously rich after their dot.com IPOs with a lot of hype from the media that they paid for, and help they got from FED's Chairman GREENSPAN's monetary policy, the GREENSPAN PUT, that eventually the taxpayers and/or owners of worthless bonds, Western retirement systems and their central banks would pay for.

At first glance, the new business elite of the 1990s appeared to be very different than salaried, bureaucratic engineers and organization men of the 1950s and the 1960s who ran the large corporations associated with ALFRED SLOAN at GENRAL MOTORS. In fact, they appeared to be a familiar type, much celebrated in the economics of an earlier age. The identification of the new class of business leaders with the old entrepreneurial archetype was irresistible in an age when ideas of FRIEDMAN and HAYEK were being aggressively promoted in business schools to justify the triumph of free markets. In fact, there was little similarity between the old and the new entrepreneurs. To a large degree, the new technology entrepreneurs were in fact the same people who had formerly worked in the great labs of the large corporations. There was also a large difference in what they did.

The "rugged entrepreneur" of the supposed old days triumphed by building smarter and cheaper and by working harder and by attracting and holding customers and market share. All of that took time, and time was something for which the information technology boom had no time. Instead, in the new age, there was a shortcut. Getting rich simply meant getting the approval of the capital markets. The right connections, a patent, a trade secret, and a business plan where the preconditions for raising money. Actual business success would come later, if it came at all. One would find out, after the fact, who had a brilliant innovation and the capacity to pursue it and who did not. But all the executives were rich, at least for a while, as soon as the money had been raised.

The investment bankers and the technologists were closely allied in the emerging ASSET MANAGER CAPITALISM. Innovation in one area, Michael Milken's JUNK BOND MARKET, helped fuel the growth of the other. The financiers combined with the techno-entrepreneurs promoted a new vision of the NEW ECONOMY, a NEW PARADIGM, hence the 1990's business school heresy. EFFICIENT MARKET HYPOTHESIS holds that all the information available that could affect the market price is already embodied in the market price. So although the market may turn out to have been "wrong" in retrospect, in the sense that it priced a stock cheaply that subsequently soared, or priced expensively another one that subsequently plummeted. It is never wrong prospectively. That is to say, it never ignores or misuses information, leading to systematic mispricing. Accordingly, if market prices diverged substantially from what traditional valuation models suggested was fair and reasonable, there must be something wrong with traditional models. The search was on for new models suggesting that market values were fair and reasonable. Hence the idea of the NEW ECONOMY and the spate of new ways of valuing companies, especially those that did not make any profits and seemed unlikely to do so for the foreseeable future.

There is a difference between a manager running a company that is not his own and an owner-operated business in which the manager does not need to report numbers to anyone but himself, and for which he has a downside. Corporate managers have incentives without disincentives. The asymmetry is visibly present. Volatility benefits managers since they only get one side of the payoffs. The main point is that they stand to gain from volatility, the more variations, the more value to this asymmetry.

In 2018, Larry Culp, the new CEO of GENERAL ELECTRIC, was awarded a contract that could pay out $237million. In 2017, a CEO at one of America's 350 largest firms earned on average $18.9million, according to ECONOMIC POLICY INSTITUTE of Washington D.C., that is 312 times as much as the average worker's earnings- a ratio close to its peak, 344, in 2000. The similarity between 2000 and 2017 is the soaring value of stock options. The stock market was at the end of a long boom in 2000 and surged again in 2017, prompting many CEOs to cash in their stocks. Before enthusiasm for awarding stock options to executives took off as USA moved from MANAGERIAL CAPITALISM to ASSET MANAGER CAPITALISM, the ratio between CEO and worker pay was 32, just as CEOs started to be paid more in form of equity, the stock market took off. At the start of 1985 American stocks traded at on a cyclically adjusted ratio of 10, in 2018 the ratio is over 31 according to Robert Schiller of Yale University.

A FORTUNE study in 2013 showed that only 1% of the American companies poached a CEO from abroad, and many promote from the inside. In Japan CEOs have rarely been given stock options, and Japanese executive pay is a little more than a 10^{th} of that in America, and about a quarter of the British level. Deborah Hargreaves in ARE CHIEF EXECUTIVES OVERPAID? (Hargreaves, 2019) summarizes that CEOs' pay in FTSE 350 companies rose by 350% while pre-tax profits rose by 195% and revenues by 140% between 2000 and 2013. One problem is that the award of equity to executives means that the income-rich and the capital-rich are more than ever the same people in the USA and the UK.

Near industrial history of the United States, according to business school mantra, was to be seen as indistinguishable from a world of free and competitive markets. In the textbook sense, a very large number of very small firms, each produced a standard product by standard methods and taking prices as given by the market itself. The well-developed, highly stylized, utterly irrelevant principles of the free and competitive markets were to be applied to the world of unstable and changing corporations, whatever the violence to the facts. The business schools in America propagated the revival of conservative myth, the application of a set of aged ideas to a world in no way suited to receive them.

Orthodox neoclassical economic theory is a mathematical representation of human behavior, and like any mathematical model it is based on certain assumptions. In the case of economics, the assumptions are largely out of touch with reality. Many think the assumptions are reasonable because they are based on ideas from areas like physics or engineering that are part of the West's 2,500-year scientific heritage dating back to ancient Greeks. Superficially orthodox economic theory seems to have the look and feel of science, without empirical verification of sciences.

The orthodox economic theory, in its linearity, rationality, and obsession with concepts such as scarcity and equilibrium, is PYTHAGOREAN to the core, and has been ever since the subject was modelled after physics in the 19^{th} century. Neoclassical economics was explicitly modeled after NEWTON's "rational mechanics". NEWTONIAN dynamics can be expressed through the calculus of variations as an optimization problem: objects moving in a field take the path of least action. LEIBNIZ had explained the idea by comparing God to an architect who "utilizes his location and the funds

destined for the building in the most advantageous manner." Reasoning along the same lines, neoclassical economists assumed that in the economy, individuals act to optimize their own utility – defined rather hazily as being whatever is pleasurable for that person – by spending their limited funds. Economists could then make NEWTONIAN calculations about how prices would be set in a market economy to arrive at what WILLIAM STANLEY JEVONS called a "mechanics of self-interest and utility".

A reason why mathematics works so well in physics is that, as far as we are told, subatomic particles such as electrons and quarks are the same everywhere in the universe. As a result, a hydrogen atom on Earth is the same as one in the Sun. People on the other hand, are different. To get around that problem, economists argued that what really counted was the behavior of the "average man". This concept was first introduced by the French sociologist, ADOLPHE QUETELET, who saw the average man as representing "perfect harmony, alike removed from excess or defect of every kind...the type of all which is beautiful – of all which is good". As economist FRANCIS EDGEWORTH put it, "the first principle of economics is that every agent is actuated only by self-interest." Thus was born HOMO ECONOMICUS, or "rational economic man" – an idealized expression of Nietzsche's APOLLONIAN PRINCIPIUM INDIVIDUATIONIS.

Using this imaginary being as the atom of the economy, economists argued that in a competitive market prices would be driven to a stable equilibrium via ADAM SMITH's invisible hand. If a particular good were too expensive, then more suppliers would enter the market and competition would drive the price down. If prices were too low, then suppliers would go broke or leave and the price would rise. The result, according to FRANCIS EDGEWORTH, would be "the maximum pleasure" for both individuals and society as a whole. In the 1940s, JOHN VON NEUMANN used "rational economic man" as the basis for his game theory, which studied the interactions between rational actors who are trying to optimize their own outcomes in conflict.

In the 1960s, economists KENNETH ARROW and GERARD DEBREU used a method popular in game theory known as BROUWER's FIXED-POINT THEOREM to prove that, under certain conditions, free markets lead to optimal "fixed point" for the economy in which prices are set at their correct levels and nothing can be changed without making at least one person worse off. This result – a harmony of parts in which any change is for the worse - was soon being claimed as proof that capitalism was superior to communism. But to accomplish this feat, the powers of "rational economic man" had to be extended to include infinite computational power and the ability to devise plans for every future eventuality. The ARROW-DEBREU MODEL is called the crown jewel of neoclassical economics, and inspired the development of GNERAL EQUILIBRIUM MODELS which are still relied on by policy makers today. Unfortunately, numerous studies have shown their predictive accuracy is not much better than random guessing.

10.Fire [finance, insurance, real estate] on planet earth, is it arsony?

The whole of economic life is a mixture of creative and distributive activities. At any given stage of economic development, successful societies maximize the creative and minimize the distributive. Societies where everyone can only achieve gains at the expense of others are generally impoverished. They are also usually intensely violent. A critical distinction that Roger Bootle makes in THE TROUBLE WITH MARKETS: SAVING CAPITALISM FROM ITSELF (Bootle, 2012) is between creative and purely distributive activities. Bootle's distinction is close to what William J. Baumol highlighted in his delineation of ENTREPRENEURSHIP, MANAGEMENT, AND THE STRUCTURE OF PAYOFFS (Baumol, 1993). The market economy creates GDP growth not because every person is continually involved in activities that, in classic income-accounting terms, create value, but because on the average competition between individuals and firms are in their direct effects purely distributive.

Bootle suggests that as average income increases richer societies tend to become more litigious societies. In richer societies consumers are able to devote a significant slice of income to buying goods solely because they bear a brand. An increasingly rich economy is likely to be one in which more of productive activities are devoted to zero-sum and distributive competition. As the richer societies get, as measured by per capita GDP, the more arbitrary and uncertain some of the conventions required to calculate GDP becomes.

Rana Foroohar in MAKERS AND TAKERS: THE RISE OF FINANCE AND THE FALL OF AMERICAN BUSINESS (Foroohar, 2016) agrees with Adair Turner who in BETWEEN DEBT AND THE DEVIL (Turner, 2016) explains that rather than funding new ideas and projects that create jobs and raise wages, finance has shifted its attention to securitizing existing assets like homes, stocks, and bonds and such, turning them into tradable products that can be sliced and diced and sold as many times as possible, that is, until things blow up, as they did in 2008. Turner estimates that a mere 15% of all financial flows now go into projects in the real economy. The rest simply stays inside the financial system, enriching financiers, corporate titans, and the wealthiest fraction of the population, which hold the vast majority of financial assets in the United States and, indeed the world.

Rana Foroohar claims that America's shift to ASSET MANAGER CAPITALISM in which finance became an end of itself, rather than a helpmeet for Main Street, has been facilitated by many changes within the financial services industry. One of them is a decrease in lending, and another is an increase in trading, particularly the kind of rapid-fire computerized trading that now make up more than half of all US stock market activity. The entire value of the New York Stock Exchange now turns over once every 19 months, a rate that has tripled since 1970s, growing the size of the securities industry 5-fold as a share of GDP between 1980 and mid-2000s while bank deposits shrunk from 70 to 50% of GDP.

In this man-made ecology, the financial sector's share of the US GDP has soared from 2.5% in 1947 to 4.4% in 1977 to 7.7% in 2000. By then some 40% of corporate profits of the companies listed in S&P 500 were in the financial sector. These firms' share of the total S&P 500 market capitalization was approximately 25%. Even more startling, the combined income of the nation's top 25 hedge fund managers exceeded the compensation of the combined income of the CEOs of all companies listed in the S&P 500. In 2008, no less than one in every $13 in compensation in the US went to people working in finance. By contrast, after WWII a mere one in $40 was the compensation of the people who worked in finance. In the first half of 2015, the United States boasted $81.7trillion worth of financial assets, more than combined total of next three countries, China, Japan and the United Kingdom. One of the most pernicious effects of ASSET MANAGER CAPITALISM has been the rise of finance and its role in the growth of massive inequality.

The attenuation of ownership has reached a point where between one-third and one-half of most of the large corporations in the United States are owned by institutions, not by only mutual funds, but insurance and pension funds, charitable endowments, churches, colleges and universities, public service foundations, and private trusts funds generally. At first glance one might think that the vesting of ownership in such responsible hands of money managers would make for stability. Quite the contrary. The managers of funds are indeed responsible, but theirs is a fiduciary responsibility, which constrains them to accept whatever offer promises the highest immediate gain for beneficiaries and their asymmetric bonuses. If they do not, they may find themselves defendants in a suit for damages.

The predominant neoclassical economics has perceived increased financial activity – greater market liquidity, more active trading, financial innovation – as broadly positive development. This is because extensive financial activity is essential to 'complete' markets. The first fundamental theorem of welfare economics, demonstrated mathematically by KENNETH ARROW and GERARD DEBREU, illustrates that a competitive equilibrium is efficient. Complete and perfect markets deliver a PARETO-EFFICIENT equilibrium, in which no one person can be made better off without making someone worse off. And the development of the efficient-market and rational-expectations hypotheses suggested that financial markets are in fact efficient, and that the conditions required for efficiency and for rational and stable equilibria apply even in contracts between the present and the future, which financial markets provide. Together these ideas provided the intellectual underpinning for the powerful ideology of market liberalization and deregulation, an ideology that became increasingly dominant over the last several decades – the WASHINGTON CONSENSUS.

According to WASHINGTON CONSENSUS, almost all economic activities could be made more efficient if markets were allowed to operate with minimal interference. Free trade, product-market liberalization, and structural reform of labor markets were all perceived as elements of a universally relevant policy approach, and free financial markets with unrestricted flow of long and short term capital, and financial deepening with access to a wide array of different financial markets and services as essential to the efficient allocation of capital.

The political ideology was free-market capitalism. The intellectual underpinning was the concept of market completion. The idea that the more market contracts could exist, and the more freely, fairly, and transparently they could be struck, the closer we could get to the most efficient possible outcome, the one most favorable to human welfare. One of the consequences of the capital-account and financial-market liberalization that followed was a very steep increase over the last 30 to 40 years in the relative scale of financial activities within the economy, with dramatic increases in capital flows, in the financial markets' trading volumes, and in the size of financial

institutions' balance sheets relative to real non-financial activities.

The financial system had grown too large. It had ceased to be a means to an end and had become an end in itself. The size and scale of financial market activity in relation to the underlying economy has led some to question whether unfettered free market economy had promoted finance, the servant, to the position of master of the economy and, more broadly, society. An excessively large financial sector relative to the GDP should be a cause of concern to those interested in long-term economic growth because financial crises are often associated with unsustainable growth of the financial sector. Mariana Mazzucato in THE VALUE OF EVERYTHING: MAKING AND TAKING IN THE GLOBAL ECONOMY (Mazzucato, 2018) scrutinizes the way economic value has been accounted and reveals how neoclassical theory failed to delineate the difference between value creation and value extraction, allowing certain actors in the economy moving around existing value or, even worse destroying it to benefit themselves.

A 2011 study by the SWISS FEDERAL INSTITUTE OF TECHNOLOGY mapped the network of direct and indirect ownership links between 43,000 transnational corporations to make a map of financial power in the global economy. The research summarized that less than 1% of the companies were able to control 40% of the entire network. Most of these powerful companies were financial institutions from the "virtual" financial economy, companies that make money out of money. As the researchers point out, this dominance by a small group can be viewed as the outcome of a natural process and does not demonstrate conspiracy or collusion.

The distribution of power in the economy is related to the fractal structure which characterizes many natural systems. A common property of fractal objects is that their features exhibit what is known as scale-free, power-law statistics. There is no typical size or scale. The only rule is that the larger event or feature is, the less likely it is to happen. There is no such thing as "normal" pattern and extreme events are part of the landscape. Similar relationships hold for price changes in a stock market, the size of craters on the Moon, the diameters of blood vessels, the populations of cities, wealth distribution in societies, and many other phenomena. But it is clear from the network map of the SWISS FEDERAL INSTITUTE OF TECHNOLOGY that the symmetrical neoclassical picture, which sees the economy as being made up of independent "average" firms of similar power, is rather misleading as Benoit Mandelbrot has argued since 1975 in FRACTALS: FORM, CHANCE AND DIMENTION (Mandelbrot, 1998).

In the three decades before the crisis, the financial services industry has undergone exorbitant and utterly unwarranted growth, driven by financial liberalization, financial innovation, elimination of capital controls, and globalization of finance. This triumph of finance is inexorable so long as ownership carries no responsibilities. Irresponsible owners are classical HOMO ECONOMICUS par excellence, and they go where they can get the most of what they are interested in, which is money. Hence they put pressure on brokers to find them companies that will slake their thirst. Brokers pressured investment bankers to float the issues of such companies. Investment bankers pressured commercial bankers to give priority to such companies. Pressure, then was brought to bear on the management of public companies to do whatever needed to be done to thicken the bottom line. Frequently, merger-and-acquisition-and-diversification is the outcome. Bottom line is improved by rationalizing the merged companies by downsizing, closing plants and firing people. Finance remained relatively independent from the rest of economic activity, and even became predatory and destructive toward it.

One property of such networks is that they are susceptible to seizure-like failures. As Albert-Laszlo Barabasi wrote in BURSTS: THE HIDDEN PATTERNS BEHIND EVERYTHING WE DO, FROM YOUR E-MAIL TO BLOODY CRUSADES (Barabasi, 2011) "Cascading failures are a direct consequence of a network economy, of Inter-dependencies induced by the fact that in a global economy no institution can work alone." Orthodox neoclassical economic theory is based on a very particular type of network, one in which economic agents have no connection with one another at all, except to buy and sell.

11. The cesarean birth of fx market: privatization of the measuring stick of world's monies

We need to try to model the economy not as an efficient and independent machine, but as something more like a living ecosystem. ADAM SMITH's invisible hand is an emergent property of this system, which never reaches an optimal equilibrium, but instead is fundamentally dynamic and unstable, with complex effect on society. The financial network is both highly creative and prone to seizure-like crashes. The entire financial system is now described as a kind of virtual network of electronic information. Since

NIXON's exit from BRETTON WOODS AGREEMENT, currencies have floated against one another. The result has been an explosion in the amount of currency dealing. Every day, around $5trillion is shuffled around computer networks, bouncing off satellites, relaying through computer terminals, like the neural signals of a giant electronic brain.

Excess credit creation of American banks and their affiliates in EURODOLLARs resulted in radical increases of foreign investments by American corporations in Europe in the 1960s. Then the US dollar was effectively the world's currency, and thus additional creation of dollars was expected to be diffused around the world without any adjustment in exchange rates until the world rebelled. When the US corporations tried to buy the world with the credit American banks and their affiliates created, France called the US's bluff that set the value of the US dollar at $35 for one Troy ounce of 24 karat gold with BRETTON WOODS AGREEMENT. France decided to convert US dollars into gold at the official fixed price, as BRETTON WOODS SYSTEM formally provided for. The US leadership had to make the decision either to keep its promise and redeem the excessively created dollars into gold, or break its promise and with it bring down the BRETTON WOODS SYSTEM of fixed exchange rates. France proceeded to demand conversion of dollars into gold, in an episode later called the "French raid on Fort Knox". Nixon decided to break US's promise. He closed the GOLD WINDOW. With this, the fixed exchange rate system had ended, and currencies started to float for the first time without any link to gold. The fiat money float began to emerge, FOREIGN-EXCHANGE [FX] market.

President Nixon ended dollar's tie to gold on 8/15/1971. Two decades later, monetary policies of ALAN GREENSPAN pushed the prices of financial assets and real estate up making them havens for investors to avoid US dollars' depreciation, as the US economy changed from an industrial powerhouse into a financial and consumption casino that imploded with 2007-2008 financial crisis. According to BANK OF INTERNATIONAL SETTLEMENTS [BIS], in 2013 at $5.3trillion per day, FX, currency trading dwarfed all the globe's stock markets and was 73 times greater than all global trade in goods and services.

It seems that nobody called Japan's bluff during the 1980s, when the credit Japanese banks created enabled Japanese corporations' purchasing sprees of buying foreign assets. The world seemed to have enjoyed not suffered from YEN ILLUSION. When BANK OF JAPAN abruptly stopped credit creation in 1989, JAPAN's double bubbles burst and capital outflows from Japan came to a halt and eventually reversed.

However, in this new world of floating currencies Nixon's decision gave birth to placed a great burden on the newly born foreign exchange markets. If a country decides to create more purchasing power than is backed by its real economic activity, the task of recognizing this was now foreign exchange markets' by selling enough of this currency to reduce its value. The Japanese experience of the 1980s demonstrated that even the yen-dollar foreign exchange market, the most liquid market in the world, failed its responsibility. Apparently foreign exchange market participants for years were either unaware of the BoJ's excessive credit creation., or failed to understand its implications and act accordingly.

The FORIEGN-EXCHANGE [FX] market is not transparent, but opaque. It is technologically old to accommodate its oligopolistic market structure. Old-boys' network. And, it is colossal. Most of its $5trillion of daily trading happens 'over-the-counter' [OTC], in deals negotiated between banks and private customers, rather than on exchanges. Many orders are still placed by phone. To Gauge its market's size and structure usually mandates reliance on outdated surveys provided by outsiders. The most comprehensive review, by the BANK OF INTERNATIONAL SETTLEMENTS, is conducted only once every three years. Yet modernity is arriving in fits and starts. In April, 2019, it emerged that DEUTSCHE BORSE, Europe's third largest stock exchange, was negotiating to buy FXall, an electronic FX-trading platform, for a reported $3.5billion. It signals at a shake-up in a sector that has long been deemed antediluvian.

The FX market serves not only investors, but corporations and governments seeking to protect trade or bonds against currency swings. FX contracts can be 'spot' for immediate delivery, 'forward' for delivery at a later date, or 'swap' when currency is exchanged back at maturity. Buyers go through dealers, mostly big banks, which source liquidity. Specific needs, such as matching cash-flow dates, are met using OTC trades. This is not likely to change soon. Rather, DEUTSCHE BORSE is betting that buyers will abandon "voice" orders, placed via single banks, in favor of digital platforms that pool prices from multiple dealers. The trend is already boosting e-trading in spot FX. Over the last 10 years, volumes have doubled and FXall's share of this electronic activity has reached 40%.

The change has been slower with longer-dated FX-derivatives contracts, such as forwards. The longer the maturities, the fewer the

transactions, and the harder it is to connect enough users simultaneously in order to get e-trading to work. But, tighter regulation is increasing costs, that asset managers are seeking to offset elsewhere. European regulators demand that they demonstrate that they are trading at the best possible price. E-trade, by connecting buyers with multiple dealers in an instant, as well as leaving a clear audit trail achieves both. As long-dated contracts become more common, liquidity will be boosted.

As FX goes digital, the ranks of dealers are expected to be reduced. In the spot market, the trend has developed "principal" trading firms, which buy and sell on their account using algorithms. It has also fueled competition among banks, slashing margins and pushing smaller ones to exit the business, leaving bulk of the deals to handful of big banks, often in partnership with principal trading firms. A cozy arrangement for the time being. Maturities beyond a week have been little affected so far. The rise of centralized clearing is also helping to level the playing field. Only 3% of FX derivatives' trades currently go through clearing houses, which absorb the risk one party defaults. Clearing is set to become more attractive for traders, in part because regulators are requiring higher collateral to be held on some un-cleared FX deals. E-trading already makes it easier for users to find non-bank dealers. By moving counterparty risk, clearing will weaken the advantage that banks with big balance-sheets enjoy over the newer trading firms.

To deal with increases in the floods of money, major banks spent half a trillion dollars on information technology, decisively leading all other sectors on computer outlays. The work of maintaining the measuring stick function of money is estimated to cost 20% more in computer equipment than all the world's information technology for manufacturing new goods. With vastly greater speed and automation, the large banks with big balance sheets perform the role previously played by the gold peg, while at the same time putting constraints on every country to follow its own exchange policy. Dangerously banking intensive, the system channels all the world's commerce through the portals of the great international banks. Just 10 in the United States and 15 in United Kingdom and enables these to collect fees. With 16.11% of total trading in May 2015, the largest player was CITIBANK, DEUTSCHE BANK ranked second with 14.54% (The Economist, 2019). Moreover, that work yields a volatile but steady rising proportion of all banking profits. In this emerged system of private SEIGNIORAGE – profiting from creating money – the largest traders capture hundreds of billions of dollar's equivalents every year from setting the measuring stick. FX market is a speculative ocean of currencies that banks surf for profits. These banks extract the fees as a kind of volatility tax on entities that use them to hedge currencies.

By various measures 90% to 97% of all transactions are judged to be "speculative" devoted not to enable trade in goods and services but to harvest profits and fees from arbitrage and leverage. Transacting some 77% of the business are 10 banks in the Western countries. In the forefront of the foreign exchange operations are the US and Europe, with London accounting for 36% of all trades. Some 87% of transactions involve the US$, in which 63% of all international trade is denominated and which accounts for more than half of all global reserves held by central banks to back their currencies. Currency trading has been rising at least 20 times faster than productivity growth. Devoid of ISAAC NEWTON's gold standard that made economic valuations calculable and reliable as the physical dimension of traded items, China, Hong Kong, Singapore and Taiwan, that have spearheaded the global trade expansion in recent decades, have all largely opted out of the floating-currency system. Against agonized protests from the West, lately loudly from President Donald Trump's White House, they fix their currencies on the dollar as much as possible, and some of them impose controls on capital movements. Outside of the Asian emerging sector, world trade has inched up only slowly. Likewise, global GDP growth. A privatized SEIGNIORAGE conundrum.

12. Is planet earth alive?

It is a habit of contemporary public relations to frame today's the global economy as 'economy' and, more insidiously, to present it as a natural phenomenon whose putative laws must be regarded with the same deference as the laws of physics. But as some argue cogently, our global economy is but one of many possible economies, and, unlike the laws of physics, we have political choices to determine when, where, and to what degree the so-called laws of economic behavior should be allowed to hold sway. An economy is a man-made ecology, or rather the man-made part of our larger ecology of interaction between the man-made and natural worlds. Neoclassical economic perspective generally fails to recognize that economy is merely one aspect of a whole ecological and social fabric. And at times economists

have tried to remodel the environment to fit to the neoclassical model as during Russian transition to capitalism and globalization of finance at the end of 20th century explains Roger E. Backhouse in THE PUZZLE OF MODERN ECONOMICS: SCIENCE OR IDEOLOGY? (Backhouse, 2010).

Planet Earth is a living system composed of human beings in continual interaction with one another and with their natural resources, most of which are, in turn, part of mega-living system, GAIA. Planetary physiology, GAIA, is the result of innumerable beings. GAIA is symbiosis seen from space. Any organism that appears or species that evolves at first has a chance. But to persist, life forms must survive not on their own but within a global environment. They become integrated, or they die away. In the long run organic beings confront their limits of their multiplication. They survive not alone but within a context of global life. Lynn Margulis and Dorion Sagan in WHAT IS LIFE? (Margullis and Sagan, 2000) argue that the strength of symbiosis as an evolutionary force undermines the prevalent notion of individuality as something fixed, something secure and sacred. A human being in particular is not a single, but a composite. Each of us provide a fine environment for bacteria, fungi, roundworms, mites, and others that live in and on us. Our bodies are actually joint property of the descendants of diverse ancestors. Survival seems always to require networking, more interaction with members of other species, which integrates surviving species further into global physiology.

The basic reductionist error of the social sciences is to divide this fabric into fragments, assumed to be independent and to be dealt with in separate academic disciplines. Those economists who wished to study economic phenomena as they actually existed, embedded within society and the ecosystem, and who therefore dissented from the narrow economic viewpoint were virtually forced to place themselves outside economic 'science', thus saving the economics fraternity from dealing with the issues their critics raised. MAX WEBER, for example, the 19th century critic of capitalism, is generally regarded as an economic historian. JOHN KENNETH GALBRAITH and ROBERT HEILBRONER are often thought of as sociologists. KENNETH BOULDING is referred as a philosopher. KARL MARX, by contrast, refused to be called an economist and saw himself as a social critic, asserting that economists were merely apologists for the existing capitalist order. In fact, the term 'socialist' originally described those who did not accept the economists' atomistic view of the world.

By subsuming land within the category of capital, almost all post classical economists treated Nature to be a subset of the human economy, an endless pile of resources to be transformed into wealth. Where economists assume that needed resources will magically arise because the marketplace demands them, a more holistic model would begin with the observation that the economy only exists because resources are available. The economists also assumed that natural resources could always be substituted with some other form of capital, money or technology.

The reality, of course, is that the human economy exists within and entirely depends on Nature, and many natural resources have no realistic substitutes. The natural world is not a subset of the economy. It is the other way around. The economy is a subset of the natural world. This fundamental logical and philosophical mistake, embedded at the very core of mainstream economic philosophies, set society directly on a course toward the current era of climate change and resource depletion, and its persistence makes conventional economic theories, of both Keynesian and neoliberal varieties, utterly incapable of dealing with the economic and environmental survival threats to civilization in the 21st century.

In classical NEWTONIAN science nature was seen as a mechanical system composed of basic building blocks. In accordance with this view, DARWIN proposed a theory of evolution in which the unit of survival was the species, the subspecies, or some other building block of the biological world. But a century later it has become quite clear that the unit of survival is not any of these entities. What survives is 'the organism-in-its-environment'. Matt Ridley in NATURE VIA NURTURE (Ridley, 2003) shows that nature evolves via nurture. An organism that thinks only in terms of its own survival will invariably destroy its environment and, as we are learning from bitter experience, will thus destroy itself.

From the systems point of view the unit of survival is not an entity, but rather a pattern of organization adopted by an organism in its interactions with its environment. Evolution is basically open and indeterminate. There is no goal in it, or purpose, and yet there is a recognizable pattern of development. The details of this pattern are unpredictable. In the systems view, the process of evolution is not dominated by 'blind chance' but represents an unfolding of order and complexity that can be seen as a kind of learning process, involving autonomy and freedom of choice.

The systems approach to economics will make it possible to bring some order into the present conceptual chaos by giving economists the urgently needed ecological perspective. According to the systems view, the economy is a living system composed of human beings and social organizations

in continual interaction with one another and with the surrounding ecosystems on which our lives depend. Like individual organisms, ecosystems are self-organizing and self-regulating systems in which animals, plants, microorganisms, and inanimate substances are linked through a complex web of interdependencies involving the exchange of matter and energy in continual cycles. Linear cause-and-effect relationships exist only very rarely in these ecosystems, therefore linear models are not very useful to describe the functional interdependencies of the embedded social and economic systems and their technologies.

The nonlinear interconnectedness of living systems suggests two important rules for the management of social and economic systems. First, there is an optimal size for every structure, organization, and institution, and maximizing any single variable, profit, efficiency, or GNP for example, will inevitably destroy the larger system. Second, the more an economy is based on the continual recycling of its natural resources, the more it is in harmony with the surrounding environment. In THE TURNING POINT: SCIENCE, SOCIETY, AND THE RISING CULTURE (Capra, 1983), Fritjof Capra offers a compelling vision of a reality, a reconstruction of science and the human spirit for a balanced future. In a world, where everything is anteceded and interconnected, there is no room for autonomous sources of causation. To claim otherwise is scientific heresy and a philosophical death wish. The entelechy, the uncaused causal agent, is fiction and its source is delusional. Fritjof Capra and Pier Luigi Luisi in THE SYSTEMS VIEW OF LIFE: A UNIFYING VISION (Capra and Luisi, 1983) examine autopoiesis, dissipative structures, social networks, and a systemic understanding of evolution and develop a coherent framework by taking a broad sweep through history and across scientific disciplines.

13. Can cook ratios be cooked under bis's watchful eyes?

The literal failure of the financial system, and the deep and long recession it triggered, offered a dramatic demonstration of the unsustainability of the way the global financial system had been operating. The huge burden of public debt created in the course of the financial breakdown remains, and remains unsustainable. The debt burden due to financial crisis comes on top of existing government debt burdens, sometimes acknowledged, more often off the books either as a deliberate sleight of hand or because they are implicit in the promise of future pension and welfare payments. As well as repaying the debts incurred in sorting out the banking crisis, taxpayers will have to shoulder the debts created by a system of pensions and social welfare, particularly in the rich countries.

The repaying of the public debt of the financial sector's bailout coincides with the developing demographic problem. In 2019, 40 countries have shrinking working-age populations, defined as 16-65 year-olds, up from 9 in late 1980s, according to the WORLD BANK. China, Russia, Spain joined recently. Thailand and Sri Lanka soon will. The balance between people over 65 and those working age, is known as the old-age dependency. It is likely to deteriorate faster because the ranks of employable are decreasing. In Japan where young people are few and life expectancy long, demographers expect 48 people over the age of 65 for every 100 people of working-age in 2020. In 1990 there were just 17. Some countries face gentle downward slopes. Others face steep slopes. Both China and France are gradually losing working-age people. Numbers in France are expected to fall slowly over the next few decades, but in China the numbers will soon plunge. Partly as consequence of its one-child policy.

For more than a generation Western governments have been borrowing on a large scale from their own citizens. But, the governments of the UK and the USA borrowed increasingly from foreigners, from much poorer countries, and are now also facing old-age dependency problems. The cost of these promises will be piled onto taxpayers as yet unborn or too young to vote plus, of course, the added to the costs of debts created by the bank bail-outs. In some countries the scale of the government debt is so large that it can depress those countries' potential to grow enough ever to meet the burden of repayment.

A growth strategy based on financial deregulation was first adopted by the US and the UK in the early 1980s, and later more extreme forms were implemented by Iceland, Ireland, Latvia and Dubai. What was encouraging more and more countries to adopt a growth strategy based on deregulated finance was the fact that in such a system it is easier to make money in financial activities than through other activities, or so it seemed until the 2007-2008 crises.

The financial crisis comes down to one simple fact: liquidity. In other words, the amount of outstanding discounted bills of credit and thus the amount of credit and debt of various agents has increased dramatically by comparison to what was in the 1970s. It seems inflation in the price of goods, or in costs, including wages, for the years 1970-1980 has been replaced by an inflation of financial assets in the 1990s and after.

The multiplication of liquidity means of payment on the basis of credit, the true source of the ex nihilo creation of money, has been observed at all stages of history of money and has taken different and highly technical forms lately with derivatives and collateral instruments. The key thing to understand is that transformations of the rules of governing monetary creation in the various different aggregates are all expanding.

The percentage of liquid assets, in other words, the means of mobilizing resources immediately in cash, which previously stood at 8% of their commitment: a proportion known as the COOK RATIO, has been modified. In order to determine the maximum credit that a bank can give in relation to its own funds, that is the capital it is able to mobilize very quickly in order to address repayment requirements, operational risk has now been added, risk of losses due to people or systems failures. This seems to add a measure of improvement, but also a MARKET RISK, so that the value of credit granted by the bank has to be adjusted to its market value. If the bank is listed and if the market is on the way up, the assets of the bank increase and the bank itself can grant more credit. If the reverse is true, the bank will have to increase its stockholders' equity by selling shares. This is pro-cyclical. Rather than countering and balancing cyclical movements, it accentuates them. It acts as an accelerator of MARKET EXUBERANCE, as GREENSPAN phrased it, during expansionary periods, and also a decelerator of depression during downturns.

Financial deregulation has been marked by a series of financial innovations such as the securitization of public debt, real estate loans, collateral debt obligations, agreements for insurance on payment default, swaps, leveraged buyouts. There is no point in asking which of these financial innovations and changes in accounting practice came first. Like the chicken and the egg, they emerged in rapid response to each other and each provides backup for the other. It was not clear what the unintended consequences of financial innovations would be at the time, but later we will able to observe what they were. Nationalization of liabilities financial institutions turned their losses into public debt.

Leveraging, or the ability to increase the amount of loans granted on the basis of advance deposits and more globally on the basis of the equity of financial institutions, has increased almost five-fold. Whereas formerly $1 of resources immediately convertible into cash would have allowed between $5 to $8 of credit, or fresh liquidity, the COOK RATIO, to be offered. By the eve of the crisis the figure was more in the region of $30 to $35.

Once a financial backwater with a reputation for excessive regulation, with its stock market only set up in 1985, Iceland was transformed into a new hub in the emerging global financial system. From the late 1990s, Iceland grew at an extraordinary rate and became the 5th richest country in the world after Norway, Luxemburg, Switzerland and Denmark. Ireland tried to become another financial hub through the same strategy, with its financial assets reaching the equivalent of 900% of GDP in 2007 and 11 times before the crisis. And then in 2008, Iceland and Ireland collapsed.

14.Accounting systems that mis-account: is the chinese accounting system a panacea or placebo?

Financial accounting has evolved to generate annually published financial statements that are meant to provide corporate transparency. Thereby, enabling the investing public to evaluate corporate behavior and provide the capital markets with the information to help the markets function efficiently. The financial information is provided in three 'statements': the income statement, the cash-flow statement and statement of retained earnings and the balance sheet. But as the notorious implosions of Enron, and other corporate scandals in the late 1990s and early years of the first decade of the 21st century showed these accounting tools cannot be trusted to convey the true state of a business at all. And yet governments, managers, policy makers and shareholders alike depend upon this information when making decisions that affect the lives of everyone.

The world lost its trust in the US GAAP and its auditors after the accounting scandals that bankrupted very large American multinational corporations destroying the savings of millions of investors who bought their stocks and bonds. The US GAAP are the accounting standards United States developed and imposed on the world after the Second World War through the two institutions created to manage the global economic system; the IMF and the WORLD BANK. To deal with the limitations of the US GAAP, the Europeans formalized the INTERNATIONAL ACCOUNTING STANDARDS in the last decade of 20th Century. The 21st Century had the European and the American Standards. Most of the stock markets of the world mandated the financial statements to comply with the European Standards, but not the American Exchanges. The Peoples' Republic of China's first choice was the European

Standards, but later after 2008 they decided to establish their own accounting standards.

The annual financial statements of ROYAL BANK of SCOTLAND kept in compliance with the INTERNATIONAL ACCOUNTING STANDARDS were signed by the auditors in February of 2008. By asset size RBS was bigger than the GDP of the UK. Two months later, RBS was sinking with a loss bigger than 100billion British Pounds. The behemoths of finance and banking regardless of the accounting standards they used brought the financial system down to be bailed out by tax-payers in 2008 causing massive unemployment around the globe. The financial crisis of 2007-2008 seemed to be a gross failure of both of the prevailing financial accounting systems. They both failed to present a true picture of the economic transactions and the true health of the financial institutions.

The financial accounting systems were not the only problems. There are things profoundly wrong with the way we calculate GNP and GDP, our national income and stock of wealth. These numbers generate alarming anomalies, and yet these numbers continue to rule the policy decisions of governments, financial institutions, corporations and communities. The flawed numbers rule our lives. So sacred is the single GDP figure to the US economy that a complex ritual evolved around its announcement, rivalling in mystique and secrecy the selection and announcement of a new Catholic pope. 12 times a year, chief US statistician and his team lock themselves up in Washington without phones and internet, draw the curtains and carry out a task refined over 50 years to arrive at a single number through the convergence of some 10,000 data streams from recent economic activity in the US. That number must not be spoken out loud. Instead, it is explained in a press release the next day by the US PRESIDENT's COUNCIL OF ECONOMIC ADVISERS. So powerful is this figure that no one must utter it before its official revelation. It is released at 8:30 am the next day. And that presented a unique opportunity for President Trump to capture world's attention with his tweet before the revelation.

But the GDP was not designed for this purpose. It was not conceived to be the primary gauge of the economic health of a nation. It was not created to be a key tool for policymakers and investors. It was not born to govern the global financial markets. As a measure of national wellbeing, the GDP is a deeply flawed summary. It was developed in the 1930s in the United States to have a better handle to get the economy out of recession. Simon Kuznets, one of its creators, warned of the limitations of GDP measures, especially their exclusion of household production and other non-market activity, as well as the many omitted costs of ecological damage of economic activity. Global warming and other disasters are some of the consequences of mis-accounting of micro and macro-economic activity.

The internalization of the uniform approaches to estimate GDP by IMF and the WB created global neglect of assessing the cost of damages the developed nations have inflicted on the eco-system. The emerging economies are continuing the abuse of the eco-system at higher and faster rates. The fastest growing doubled its GDP every 7 years in the last two decades of 20th century. The GDP figures, of course, do not include the cost of environmental damage done in the process. On the contrary, actually, as the air quality deteriorates, the resources spent on cleaning the mess and additional health care necessary to reduce the negative impact increases, so does GDP. Some development.

Peoples' Republic of China until 1979 tried to manage its economy by a centrally planned model it imported from Moscow. The results were deemed unsatisfactory. And they were. The mis-accounting of economic activities of the centrally planned years created environmental disasters, also matched in the USSR. GDP accounting system was not designed to treat nature as a scarce good, but treated it as a 'free' good with infinite supply to be exploited. Environmental disasters could have been eliminated had they changed their metrics of micro and macro-economic activities. In importing the accounting systems of market economies, the decision makers overlooked the inherent biases and limitations of market based evaluations, prices, and the total neglect of the costs of public goods exploited in economic development that these accounting systems had.

Accountants, mostly until recently, have assumed that natural resources are so plentiful that any loss of them is insignificant, not worth worrying to count. They assumed, or were told to assume that natural resources like water, soil, forest and air were free gifts of nature. They did not consider that the natural world could be used up worn out in the way that buildings and equipment can. But just as the 19th Century railway entrepreneurs had to learn that human-made capital, rails and trains, wears out and must be depreciated, so some accountants are beginning to understand that nature's capital is also subject to wear and tear, and worse, depletion. GDP's main weakness lies in the fact that it is insensitive to depreciation of capital assets. From an environmental point of view, this is very critical. It actually can be catastrophic.

GNP accounting reflect key economic flows: production, consumption, savings, investment, but they do not measure the state of capital stocks. Social, human and natural resources, as well as human-made capital such as building and equipment from which production is drawn needs to be included. By selectively focusing on flows the GDP sends misleading signals to policy makers. Activities that maximize production in the short term need not preserve the capital stocks that are central to long-term prosperity. Indeed, focusing just on GDP actually creates incentives to deplete capital stocks because the returns are treated as income. Ultimately, not recording the costs of reinvestments to sustain healthy ecosystems creates and conceals ecological liabilities. Sustainability and climate change are the big challenges of our time. We need to stop denying the escalating environmental problems by leaving environmental costs off our books.

It seems that international organizations like the IMF and the WORLD BANK, governments and businesses that are not held responsible for the environmental costs of the damages they inflict have vested interests in GDP measures which emphasize and even exaggerate economic growth. The United States published its first adjusted GDP for depletion of oil and other non-renewable resources in 1994. The figures with their downgraded estimate of US wealth proved so controversial and politically explosive that Congress shut down the program. The lawmakers solved the controversy by shooting the messenger.

From Beijing, the public and private accounting systems of the world do not look like ideal models to import in their totality. Actually, a good number of Chinese eco-system related problems could have been avoided had the decision makers been selective in using market metrics. The changes the Chinese will make in public and private accounting systems are very important with implications beyond their borders. China, for example, is a very important contributor to global warming. By rejecting KYOTO PROTOCOL, President Bush made US position clear on the issue. And so did Donald Trump in 2018 by rejecting PARIS AGREEMENT. The world needs a new leader to offer immediate solutions to a very pressing global problem. The new leader must reform public and private accounting systems to be better metrics of economic activity. We need to understand the new Chinese private accounting system.

On firms' balance sheets GOODWILL appears as an intangible asset and represents the differences between the price the company paid to buy another firm and the purchased firm's original book value. BLOOMBERG's estimate of the total GOODWILL for all listed companies in the world was $8trillion in 2018. Its estimate of total physical assets of all globally listed companies was $14trillion. Not surprisingly, the biggest goodwill reporters were mergers and acquisitions, [M&A], junkies. AT&T had $143billion; ANHEUSER-BUSCH INBEV had $137billion; GE had $82billion; BERKSHIRE HATHAWAY had $81billion. APPLE was a rarity. It had little goodwill because it has eschewed big deals. INTERNATIONAL ACCOUNTING STANDARDS BOARD, [IASB], which frames the rules in most countries apart from America, after an ongoing review, is planning a change. The existing rules are almost identical in America and Europe. When an acquirer buys a firm, it books the GOODWILL, the difference between what the firm has paid to buy the acquired and the acquired firm's book value, on its balance sheet. There is a queasy circularity about GOODWILL. The more companies bid up the price of acquisitions, the bigger the asset they can book. That may be a partial explanation why M&As peek at bull markets. The acquirer then periodically reviews this sum in an impairment test. The revised value is based on new forecasts of the expected cash-flows of the new post-M&A entity. The write-off appears as a loss on the buyer's income statement. Meanwhile, the process of impairment is horrendously subjective.

In the early turbulent stage of the global financial crisis in 2009, leaders at theG20 summit in Pittsburgh decided that the chaotic world of the DERIVATIVES that American law-makers made possible by deregulating them needed to be made safer by ensuring that they are to be centrally cleared. A decade later, the notional value of all derivatives outstanding that are parked as assets of multinational banks globally stands at $639trillion. 68% of them are centrally cleared through a handful of clearing houses. Thus, collectively these institutions contain one of the biggest concentrations of financial risk on the planet.

A subset of these derivatives are traded over the counter, [OTC], by dealers and investors rather than on exchanges. The ECONOMIST (2019) finds OTCs worrisome. The notional value of these OTC DERIVATIVES, according to BIS, is $544trillion, of which 62% are centrally cleared, and traders who avoid clearing houses will be financially penalized when new rules are implemented. Hopefully, clearing houses will work as intended if

they do not fail. The clearing house is to sit between market participants, and to guarantee that the buyer gets what the buyer bought and the seller gets the payment. Since, cash-equity trades are settled within 2 days, and a party going bust is minimal. But, the lack of transparency of bilateral trade of options stems from the buyers' and the sellers' of the option facing each other for the life of the option, and that played a big part in the 2008 financial crisis. Bilateral trades require each to keep tabs on the other's creditworthiness. When they do not know each other's positions, keeping tabs on the other's creditworthiness is difficult. If the buyer wanted to close its position early, for example, it might sell an offsetting position to another buyer. If all trades centrally clear, however, that would be known to everyone. There will be greater transparency. The raison d'etre of central clearing.

Clearing houses are mostly for-profit institutions. Their profits are expected to rise with their transaction volume, but losses for bad trades are largely to be borne by the members of the clearing houses. That seems to be a standing temptation to lower standards. Skimpy margin requirements or shallow default funds increase the chance that default of a big trade would leave a clearing house with large unmatched positions. That would then need to be covered by 4 possible sources of capital: 1. Its owner, usually an exchange, 2. its members, usually investment banks, 3. its customers, mostly investment funds, 4. The taxpayer in extremis

Clearing houses have collapsed in the past. A Parisian house collapsed in 1974 when its members defaulted on margin calls when sugar prices plummeted. One in Kuala Lumpur failed in 1983 when palm-oil futures crashed. When the Hong Kong Futures Exchange clearing house collapsed in 1987, the regulators closed the stock exchange while the government and city-state's largest banks arranged a bail-out.

The shift to central clearing has been in interest-rate derivatives and credit derivatives. Clearing houses are a new group of financial institutions that are assumed TOO-BIG-TO-FAIL. Without certainty about where a clearing house in distress can seek capital, its members and customers will be more likely to behave in ways that mean it needs that capital. Rules intended to protect taxpayers may have the paradoxical effect of putting them back on the hook. The perpetual MORAL HAZARD problem.

15. Is taxonomy alchemy?

Not many MBA programs offer 20th century French philosophy, but they could certainly can befit from it. MICHEL FOUCAULT argued that how you structure information is a source of power. FOUCAULT was obsessed with taxonomies, or how humans split the world into arbitrary mental categories in order to tame the wild "profusion of existing things". When we flip these around, "we apprehend in one great leap…. the exotic charm of another system of thought." But most MBA students are familiar with Daniel Kahneman's THINKING, FAST AND SLOW (Kahneman, 2011) that explains how these two systems, fast being intuitive and emotional, and slow being deliberate and logical drive the way we think. Daniel Kahneman's term for FOUCAULT's perception of taxonomies is "framing".

Jeff Bezos, Elon Musk, Warren Buffet and Masayoshi Son understand its importance, and with the expertise of their public relations skillfully manage how outsiders see their firms. By 2015 investors began to see AMAZON as a low low-margin retail business. Mr. Bezos changed AMAZON's image by reframing AMAZON as a high-tech firm, AWS. Its new cloud business produced a consistent and fast-growing cash flow and broke away from serial loss-making. Warren Buffet is an accomplished taxonomist who insists that BERKSHIRE HATHAWAY is neither a conglomerate nor an investment vehicle, but a one-off that can only be analyzed using a special set of rules that he has provided in an "owner's manual". This framing has shielded BERKSHIRE HATHAWAY from scrutiny and criticism over the past decade, even as it has underperformed the stock market. If, of course, you do see BERKSHIRE HATHAWAY as one-off to be analyzed by a unique set of rules.

Masayoshi Son criticized for its weak cash flow and high debt of the telecoms and tech conglomerate began to describe it as a venture capital to be assessed using his venture capital measure of internal rate of return which is both flattering and unverifiable. He has since completed the shift by setting up the VISION FUND, a giant $100billion investment vehicle in London. Elon Musk infers that TESLA cannot and should not be judged in the present by its past performance, but judged in the future. With the help of image managers, by reframing how their firms are classified and subdivided, managers can be successful in changing perceptions, lowering cost of capital when the investors keep on buying their stocks and intimidating competitors. Taxonomies are not alchemy. Eventually the firms must succeed.

Since 1926, most stock market returns in America have come from a tiny fraction of shares claims Hendrick Bessembinder in DO STOCKS OUTPERFORM TREASURY BILLS?[1] Just five stocks [APPLE, EXXON MOBIL, MICROSOFT, GE and IBM] accounted for a tenth of all the wealth created for stockholders between 1926 and 2016. The top 50 stocks account for 40% of the total wealth created. More than half the 25,000 or so stocks listed in America in the past 90 years proved to be worse investments than Treasury bills. The rise that FAANG stocks [FACEBOOK, AMAZON, APPLE, NETFLIX, GOOGLE] have held since 2015 is not unusual. The clout of leading stocks in the S&P 500 has often been higher in the past, but they were not free cash destroyers. A 21st century conundrum. Hendrick Bessembider's results are supportive of another research, which states that most stock returns are made on relatively few trading days. In the first half of 2018, 3 companies AMAZON. NETFLIX, ALPHABET accounted for 71% of DJI and 78% of S&P 500.

One of the greatest quandaries of the last three decades has been the way in which reductions in spending on research and development have coincided with an increasing financialization of the private sector. While causality may be hard to prove, it cannot be denied that at the same time that private pharma companies have been reducing their research and development budgets, they have been increasing the amount of funds used to repurchase their own shares, seemingly to boost their stock price, which affects the price of stock options and executive pay linked to such options.

In 2011, along with $6.2billion paid in dividends, PFIZER repurchased $9billion in stock, equivalent to 90% of its net income and 99% of its research and development expenditures. AMGEN, the largest biopharma company, has repurchased stock every year since 1992, for a total of $42.2billion through 2011, including $8.3billion in 2011. Since 2002 the cost of AMGEN's stock repurchases has surpassed the company's research and development expenditures in every year except 2004, and for period 1992-2011 was equal to fully 115% of research and development outlays and 113% of net income. Boosting stock prices does not create value, but facilitates extraction, rewarding stockholders and executives. The problem of stock buybacks is not isolated but rampant. In the last decade, S&P 500 companies have spent $3trillion on buybacks.

A common critique of buy-backs is an inchoate sense that firms buying themselves is unnatural. But actually, buy-backs are like dividends. Cash moves from the firm to its owners. Buy-backs' advantage is their flexibility. Unlike with dividends, stockholders can elect to participate or not, and the firm can turn the tap on and off without disappointing investors.

A second claim is that buy-backs create shareholder wealth. Does withdrawing dollars from an ATM makes you richer? No. But, buy-backs can transfer wealth between stockholders. If one sells at a price that later turns out to be lower, it makes the seller wealthier and lower price in the future lowers the remaining stock holders' wealth. Though, buy-backs send signals about managers' intent in allocating capital. They are using cash for buy-backs.

A third criticism is that firms' main motivation is to manipulate either their stock prices or their earnings per share, EPS, which can be cosmetically boosted as the number of shares falls. A fourth is that executive-pay schemes that are designed around EPS, can encourage buy-backs. A fifth concern is that buy-backs lead to low investment. There is supportive data. The firms' cash flow has risen relative to GDP since 1990s, but a lower proportion has been spent on investment.

The sixth claim is that buy-backs are a good measure of whether corporate tax reform was in the public interest. They are not. Better alternatives are whether overall investment rises more than annual tax break, whether firms' wage bills are rising and whether these effects will last. Most criticism of buy-backs is motivated by legitimate concerns about serious problems, including excessively high profits and squeezed wages, concentrated ownership of firms and reluctance of the financial industry to back more capital hungry startups.

The negative signal sent by surging buy-backs is their increasing leverage. 54% of firms had buy-backs more than they earned in the first quarter of 2018. When firms splurge on their own stock, it is a sign of excessive optimism. Note that, last time they did was right before the 2008 crash.

Jan De Loecker and Jan Eeckhout in GLOBAL MARKET POWER[1] using financial statements of 70,000 firms in 134 countries, examined markups [selling prices divided by production costs] and found average markups rose from 1.1 in 1980 to 1.6 in 2016. America and Europe saw the biggest increases. But many emerging markets markups barely rose. In China they fell. That suggests rich-world firms may have been able to increase markups by outsourcing to cut labor costs. Another possibility is that corporate concentration may have increased because of lax antitrust enforcement or the growing heft of companies benefitting from network effects, like internet firms. APPLE's staggering earnings was $60billion, or $8 per person on Earth.

As Peter Orszag, Obama's former DIRECTOR OF MANAGEMENT AND BUDGET, later at CITIGROUP, and Jason Furman, Barack Obama's CHAIR OF COUNCIL OF ECONOMIC ADVISORS, reported in a research paper that two-thirds of nonfinancial firms that had managed to achieve a return on invested capital of 45% or more between 2010 and 2014 were in either health care or information technology sectors. What allowed such gigantic profits and enormous CEO compensation in these sectors were market power. Silicon Valley saw no need to apologize. Theirs was the great technological and entrepreneurial success story of the late 20th and early21st centuries.

Antitrust, data protection and intrusive tax investigations were, as far as Tim Cook, CEO of APPLE was concerned, nothing more than "political crap", antiquated road bumps on the highway to the future. As tech oligarch Peter Theil told audiences and readers, "Creating value isn't enough – you also need to capture some of the value you create." That depends on market power. "Americans mythologize competition and credit it with saving us from socialist bread lines." but Theil knew better. As far as he was concerned, "Capitalism and competition are opposites. Capitalism is premised on the accumulation of capital, but under perfect competition all profits get competed away. The lesson for entrepreneur is clear….. Competition is for losers."

It is to the George W. Bush era that dismantled most of the checks on industry concentration and helped to shape the present state of US economy. American industry reached levels of concentration arguably unseen since the original Trust era. A full 75% of industries witnessed increased concentration from 1997 to 2012 according to Gustavo Grullon. The AT&T monopoly which had been forced to divide itself into 8 companies, was allowed to reconstitute itself into VERIZON and AT&T. AT&T bought DirecTV and TIME WARNER (Grullon, Larkin and Michaely, 2017).

Historically, six companies invited political backlash that only twice led to their breakup. First, the EAST INDIA COMPANY, a British private empire involved in opium production and trade supplying Chinese addiction among other equally awful things, lost its long standing legal monopoly over trade with India in 1813. In 1911, US SUPREME COURT broke up John D. Rockefeller's STANDARD OIL, and US DEPARTMENT OF JUSTICE's anti-trust division also initiated legal action against US STEEL, the other giant of the Gilded Age. DOJ went after IBM in 1969, and in 1974 DOJ sought to break AT&T's grip on telecoms, and did. And, the DEPARTMENT OF JUSTICE sued to dismember MICROSOFT in 1998.

16. In the age of weaponized interdependence of techological cold war, are multinationals national companies doing business abroad or are they stateless multinationals of washington consensus?

The American tech company, QUALCOMM, doing 65% of its business in People's Republic of China, with most of its profits in 2017 booked in Singapore to minimize their taxes in the Unites States, convinced the Trump administration in March 2018 to block a hostile takeover by BROADCOM, another tech company listed in the United States but domiciled in Singapore for tax efficiency, on the grounds that QUALCOMM's independence was vital to ensure America's strategic technical supremacy over China. The predator, BROADCOM, on 11/2/2017, four days before its hostile bid, announced to shift its legal base to the US.

THE PATRIOT ACT passed after 9/11 allowed the US Treasury to label foreign banks as threats to financial integrity and to ban them from the system for clearing dollar payments. In 2001-2003 America won the right to monitor SWIFT, which originally was the confidential global bank messaging system. Between 2002 and 2008 the TREASURY experimented with minör offenders. It brought to heel Victor Bout, an arms dealer; BANCO DELTA ASIA, a bank in Macau that traded with North Korea; and Nauru, a Pacific island with a sideline in exotic finance. Then went after a state owned Turkish bank, HALK BANKASI. Since 2008 Western banks have been fined for breaking American rules in the past, but not banned from dollar clearing.

The US TREASURY accused BANCO DELTA ASIA of laundering money for North Korea, prompting depositors to panic, other banks to keep their distance and Macau government to step in. The US TREASURY subsequently barred American financial institutions from holding a correspondent account for the bank, excluding BDA from the American financial system. "It is hard to escape the long arm of the dollar" was proven. Dollars dominance reflects what the economists call network externalities. The more people use it the more useful it becomes to everyone else. The dollar also benefits from a hub-and-spoke model for the exchange of currencies, the invoicing of trade and the settlement of international payments.

The global financial system is like a sewer and all of the pipes run through New York. This gives US TREASURY great punitive power and jurisdictional reach. However, not all dollar settlements are subject to American jurisdiction. It is possible to clear dollar payments in Tokyo and Hong Kong and elsewhere. But America's FEDWIRE and CHIPS, handled transactions were worth $4.5trillion a day in 2017. Hong Kong's system which runs through HSBC dealt with .8% of that amount. More over the ability of offshore dollars [Eurodollars] to enter and leave the American financial system if necessary is vital to their appeal. The liquidity of Hong Kong's system is buttressed by ~~HSBC~~'s ability to handle dollars in New York. China is developing its own international payments system based on its currency. Russia and China have agreed to increasingly conduct trade in their own currencies, rather than US$s. President Trump's withdrawal from the Iranian deal Obama and American allies have concluded increased trading in in RMB-denominated oil futures contracts China launched in Shanghai recently. OPEC's price of its exports is still in US$, and OPEC's global exports are a very large part of international trade. Increasing crude oil trades in currencies other than US$ will result in gradual de facto de-dollarization of global finance.

At the end of 2017, ZTE was the world's fourth biggest telecoms-equipment maker, with an enterprise value of $17billion with a Chinese state owned enterprise, [SOE], as its main stock-holder. ZTE's US sales were only 15%. On 4/26/2018, the US DEPARTMENT OF COMMERCE banned American companies from supplying ZTE with components for 7 years. ZTE had admitted trading with Iran and North Korea and lied about remedies it had put in place. ZTE's stocks were suspended temporarily. Though, subsequently the Trump administration softened its position.

Companies that break the law or act in concert with banned governments do not deserve sympathy. But there are unsettling concerns drawn from US government use of such weapons against big foreign companies. First, any large company can be reached. No fewer than 2,000 big companies outside America issue dollar bonds. The total dollar debt owed by companies outside America is over $5trillion. Cross-border supply chains mean most firms rely on American tech components in some way. Second, these powers can be misused, either for overtly political end or because they are badly calibrated. After ZTE, the global business community worried that HUAWEI could be next. And was in December 2018.

IT supply chains are highly specialized and globally tangled. Cutting companies off, WEAPONIZING INTERDEPENDENCE, in military jargon, can cause serious disruptions. HUAWEI is China's most prized high-tech company. Its name proudly translates as "Chinese achievement". $150billion revenues put HUAWEI in the same league as MICROSOFT. SAMSUNG is the only company that sells more smart-phones. In superfast 5G mobile networks, HUAWEI is a global forerunner with valuable patents, and has the largest manufacturing capability of telecoms equipment in the world. Its demise can cause shock waves that would rattle all of the tech world. On May 15, 2019, President Trump barred American firms from using telecoms equipment made by firms posing a "risk to national security". His was a seismic decision. All technology firms are highly interconnected. No technology firm is an island.

On May 20, GOOGLE announced its decision of stopping to supply the proprietary components of its ANDROID mobile operating system to HUAWEI. INTEL, QUALCOMM, and MICRON have also joined GOOGLE and announced their decisions of stopping sales. Interdependence, we are told, cuts both ways. HUAWEI is a very important buyer of American high-tech. QORVO, the maker of wireless communication chips derives 15% of its revenue from HUAWEI. HUAWEI is also an important customer of MICRON. INFORMATION TECHNOLOGY & INNOVATION FOUDATION estimated the cost of export controls to American firms to be $56billion in lost sales over 5 years[1]. The stock prices of American technology companies fell as a result. TAIWAN SEMICONDUCTOR MANUFACTURING COMPANY, [TSMC], announced its decision to continue supplying HUAWEI. Last few years HUAWEI has consciously made strategic moves to become less reliant on American proprietary technology by increasingly making use of chips designed by HiSilicon, its in-house chip-design unit that TSMC produces for HUAWEI. Chinese chip factories are not capable of manufacturing HiSilicon's sophisticated designs. Despite years of efforts to be self-sufficient by manufacturing its own computer chips, China spent more in 2018 on importing chips than it did on importing crude oil.

In the globally tangled chip-industry supply-chains, many non-American companies make use of American parts and intellectual property. They may therefore consider themselves covered, wholly or partially, by the American ban. ARM, a SOFTBANK owned British domociled company, whose technology powers chips in virtually every phone in the world, including those made by HiSilicon, announced its compliance with the COMMERCE DEPARTMENT's rules. That suggests that ARM will not grant HUAWEI new

licenses. It is not, however, clear whether ARM will support existing licenses.

A return to business as usual seems unlikely even when the ban is lifted in exchange for trade concessions. President Trump's administration have to has twice demonstrated a willingness to throttle two big Chinese companies. Trust in American technology firms has been eroded. China has committed billions of dollars to efforts to boost its domestic capabilities in chip-making and technology. If the ban is, on the other hand, a tactic of the strategy of the US campaign to take down HUAWEI, HUAWEI will need to look for alternative chips and software that Chinese suppliers will try to provide. The Chinese IT companies do not seem to have other options. The global supply-chains put in place with American leadership look vulnerable. Interdependence that can be weaponized is weaponized to "Make America Great Again". Global supply-chains' vulnerabilities are exposed. Like the Japanese earthquake and tsunami induced wake-up call exposing the rigid interdependencies of the globalized supply-chains.

As, generally, is the pattern in developing economies in their catch-up phase, the Chinese domestic microchip industry started at the lower-value end of the process. Its comparative strength lies in assembly and packaging chips. Dozens of firms around Yangzi delta near Shanghai, for example, specialize in this sort of work. JCET, TIANSHUI HUATIAN, and TFME are better known ones. In the age of Technologic Cold war, China is turning to design and manufacturing. Chinese firms critically rely on modifying designs from ARM. The SOFTBANK owned company's chips dominate the mobile-computing business and probably will be able to be a major if not a dominant supplier of smart devices that will make up INTERNET OF THINGS. According to company releases, ARM has plans to enter high-powered CLOUD-COMPUTING chips market.

Making progress in manufacturing high-tech chips turned out to be arduous for the Chinese companies. The Chinese up-starts face tough competition from incumbents in other countries with intimidating accumulated know-how of the best army of most trained engineers with decades of experience. Manufacturing is the most demanding part of chip making to replicate. The semiconductor manufacturing industry is about repetitive cycles of learning. HiSilicon's Kirin 980 was first smartphone chip to be produced on the 7-nanometer node, the current state of the art for squeezing in computer power. TSMC of Taiwan had the needed technology. Like APPLE and QUALCOMM, HiSilicon, had to have its chips manufactured in Taiwan, by TSMC. Furthermore, there were 29 companies with advanced fab facilities in 2001 after consolidation there are 5 in 2019. The suppliers of equipment for these fab facilities are even fewer. The Dutch, [ASML], is the dominant supplier of extreme ultra-violet lithography.

President Trump's tweets grumble about Chinese companies' pilfering American intellectual property. The idea that Chinese firms have some technology companies of their own to offer may seem unrealistic propaganda. Actually, Western technology firms increasingly show interest in Chinese tech. In some cases, they bought Chinese rivals outright. Such acquisitions date back to 2016. Most deals were small and involved niche industries. Maker of power-trains and sensors for electric vehicles, or agencies managing social-media influencers.

The French FAURECIA, leading global supplier of vehicle interiors, acquired JIANGXI COAGENT ELECTRONICS, which develops human machine interfaces in 2017. In 2018, XILINX, an American chip-maker acquired DeePhi Tech, a machine-learning start-up in Beijing. All told, American technology companies have invested $1billion in Chinese since January, 2018, according to DEALOGIC, a data provider. Chinese tech firms invested nearly four times as much, $3.8billion into those in America. In 216, APPLE put $1billion into DIDI CHUXING, and MICROSOFT took a stake in LAIYE, an AI BUTLER that handles voice commands through an app. INTEL has taken stakes in several start-ups, including, in 2018, a cloud-service provider and in 2019 a firm that writes software for cashier-free stores.

In 2018, ALPHABET paid $550million for a stake less than 1% in JD.com, the e-commerce competitor of ALIBABA. NVIDIA, an American maker of AI chips, invested in WeRide.ai, a Chinese self-driving tech, and TuSimple, an autonomous-truck stat-up. In 2018, INTUITIVE SURGICAL, a robotics company, took a stake in BRONCUS, a Chinese start-up.

In the last ten years or so, China has blocked only one foreign acquisition. And, that was COCA COLA's $2.4billion bid for HUIYUAN JUICE, a soft-drinks company in 2009. In 2018, the Chinese "negative list" of areas where investments are restricted shrank from 63 to 48 industries. Chinese regulators surprised many by not blocking DeePhi, despite how strategic its technology could turn out to be defense related and thus un-acquirable.

In 2017, the Treasury considered sanctioning CCB and AGRICULTURAL BANK, two very big Chinese banks. According to BLOOMBERG the two Chinese banks have $344billion liabilities. Sanctions could be unsettlingly counterproductive. A realistic concern is that some countries will try to develop ways to escape America's dollar reach. Careful studies of the Treasury's implementation of its new soft-power of weaponized interdependence offer a step-by-step guide what a country needs to survive without America's permission: semiconductors, several global currencies, and clearing system, credit rating agencies, commodity exchanges, a pool of investors and shipping companies.

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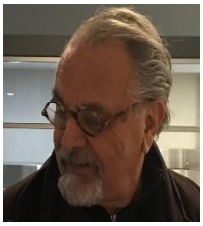

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