TECHNOLOGICAL INJECTION, DYNAMIC NEW CAPITAL MEASUREMENTS, AND PRODUCTION THEORY IN ECONOMICS

by

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ABSTRACT

This study advances the constructive implication that technological injections of dynamic variables in production contribute to societal benefits. Statistical study of the United States economy, 1964-2004, will advance the measurement of specific inputs and the impacts of comparative data on the overall production function. Furthermore, graphical presentation, game theory, set theory, and economic welfare theory will support the constructive arguments for developing nations, which would like to adopt positive and constructive strategies where global beneficial adoptions serve.

The supply and demand aspect of technological advancement only partly allows for sustainable economic success. Often-derailing details are missing from the complex strategies for global survival, when free and perfectly competitive markets are to advance sustainable economic growth. Ignorance of such details does not enhance global security but endangers it. An expanding global population needs to employ diminishing global resources to meet demands, which without education, will implode all systems, as the rate of pollution growth far exceeds the capacity of detoxification, either natural or manufactured. Other issues of health and welfare complicate realities; these without prioritization of needs, wants, and without appropriate pricing remain problematic. In this paper, we study that even segmental corrections promise improved results for the economic welfare of the globe.

The thesis states that the dynamic influences of technology and elemental factors of production --defined and measured in this dissertation-- are greater than commonly have been calculated or expected. The impacts of different measurements of capital stocks (traditional and new adjusted capital) on embodied and disembodied technological variables on productivity and economic growth of national social products are tested. The econometric effects of two new capital stock measures introduced in the writing of Friedrich August Von Hayek, John Maynard Keynes, and further developed by Evsey D. Domar, and ignored by most modern economists are examined. Therefore, we focus on the demand and supply side of technology embodied in capital, in human skill and produced goods and services, and the economy.

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CHAPTER 1

TECHNOLOGICAL ADVANCEMENTS

Technological advancements are the progress of sets of knowledge and skills used in new production or productions of new capital (human and nonhuman), and new goods and services. Progress of technology is not just the result of individualistic curiosity of inventors or scientists in an intellectual vacuum. The economic variables are among a host of stimuli that now guide institutional and business interests in technological advancements.

Introduction

The logic and application of scientific discoveries and their byproducts, innovation and technological advancements phenomena, are not as understood globally as one would conclude from the coverage. Mostly, the wiz bang byproducts such as cell phones, laptop, new electronics, medications, medical techniques, and military byproducts of technologies are valued. Yet, the production process of technological progress confuses even the experts. The process of technological advancements is not as sleek and clean as portrayed, nor is it as cheap and without negative externalities. These externalities would require expensive and time-consuming remedies for corrective actions.[1] A current (over 40 years old), vivid example is the deep sea oil drilling technical capacity, versus shut-off and clean-up technologies, and the lack of balance from private operations or

governments' regulatory, and disaster clean-up mechanism.[2] Another chronic profound polemic has evolved between the need of nuclear energy, versus the means of managing the related nuclear waste.

The simplest way to explain the difficulties involved, and the convoluted-complexities that different societies have faced, is to use examples. The way orchards with different fruit trees are cultivated can be a model. Invariably, wags, village experts, and some concerned cultivators will tell you their opinions about trees to cultivate, while the wealth of the nation (village) is in cultivation of all trees with values reflected in the market demand for their fruits, that is, all trees that the variable climatic conditions will allow you to cultivate. The most erroneous perennial argument is the one when a certain item in the budgets ends up with 20 to 70 percent of the national budgets, while the systematic process of advancements, technological changes, and the educational infrastructure all depend on 2 to 3 percent of the national budget for their basic competitive survival. The recent arguments over such requirements are illuminating among advanced European economies.[3] The OECD data show the United States has spent 2.7 percent of the 2000 budget on research and development, and Japan, 3 percent of their budget, whereas the fifteen European nations are not even close to spending enough on technological advancement. Alarmingly, the level of future expenditures remains low. That is even more puzzling.

Global Competitions

There is a profound competition for the intellectual capital in the international capital market. However, most of the national wealth goes to the wrong

human capital assets, and regulatory complication will benefit the same individuals. That misses all signals from financial markets or the economically irrational executive labor market that currently bleeds their shareholders' assets and company's lifelines. This issue is so consequential to modern life that significant numbers of European academics and scientists have publicized it. It is important to reemphasize that global competition affects all modern economic lives.

> The figures show the bloc devoted just 1.93% of its wealth (GDP) in 2003 to this important area - compared with 2.59% in the US and 3.15% in Japan.
>
> Some emerging Asian countries, such as China, are now increasing their R&D investment to a rate where they will soon catch and overtake Europe.
>
> … Europe is now on track to miss the so-called Lisbon objective of boosting its spend to 3% of GDP by 2010.[4]

The other serious dilemma is where the funding goes. Agriculture or defense getting disproportionate and irregular sums from some governments is hardly indicative of organized and constructive growth strategies in technological advancements, when funding of education and university systems go anemic, or when certain branches of government find pretexts to advance contradictory policies. This is worse if we study the depletion and alienation of 20-46 percent of minority youth in precollege years out of human capital formative lines.

In the analogy of the orchard again, different trees need maturation periods of a few years: up to five or seven for stone or citrus trees. In the meantime, while certain groups discuss the virtue of eating ripe fruit, other groups cut the trees down and use them for firewood, even wet, before trees get to produce fruits. In the meantime, what best enriches the village or a nation is to cultivate the orchards, let all trees go to fruition. In

addition, plant younger saplings to replace the old trees, as the trees get closer to the end of their productive lives. That strategy will best maintain constant supplies, or increase supplies of fruits and firewood to existing markets.

The important realizations are that the economies are not agrarian, but a complex agglomeration of many industries. The materials and capitals used are complex and have multiple uses or useful life spans. Break points, obsolescence, and replacement points of inflections can be decision-making points in temporal times. These periods may or may not coincide normally with each other. Adding to those mixtures, the biological limitation of operators, and the need for computer (failsafe) override operations, these increase the need for alert recognition of fabricated complexities injected in operational productions. In such a complex mix, it is usual for uncommon ideas or industrial strategies to gain unusual supports.

The unholy-trinity, the marriages of robotic and computerization and non-conservative extreme right ideologies (supply-side mantra void of any theoretical skeleton) have all the earmarks of forging collusions for postmodern market monopolies, joblessness, and multiple oscillatory economic implosions.[5] It is not humanitarian and pro-workers; therefore, it lacks balance and essential systemic sustainability. Its elements are acceptable globally. It is astonishing in ignoring the demand market, and unbalancing economic equilibriums' stability dimensions. Governments with even advanced economies fall victims to robotic economics' many appeals: bribes, money and wealth concentrations instead of wealth (personal or national) creation, and other contortions of market realities around us.

Importance of This Research

Governments are interested in increased productivity and economic growth, because the partial affect of technological advancements has a potential to increase the level of living for the largest segment of the governed. That will also increase the tax revenues. Private firms like the potential profit attached to the same inputs' costs producing more output, leading to more sales and possibly more profit, or the reduction in cost with lower inputs' costs (with more productivity) producing the same output yields. Therefore, these potential market influences, and effects on resource allocations, induce the investment in new and appropriate technology generations from applied and basic research. Before an invention can be used, or lead to economic growth, satisfy national needs, or supply the advertised-induced consumer demands, it must undergo its metamorphosis.

The new idea must be perceived as a marketable good or service, be applicable to a production process, or become a new machine with other old and new parts. The process is a very expensive one. Often, older capital is obsolete, before full depreciation has taken effect, while a risky new capital to replace it must pass feasibility and profitability tests. Thus, the need for increased saving and investments or upwardly adjusted investments should be clear. There is the need for a functional financial market (credit-market) to allow economic agents (entrepreneurs, small businesses) to do the needed-conversions of capital into its many forms, while creating new jobs. In addition, for the economy to risk its resources there ought to be a financially sound, and functioning economy. Otherwise, there is a risk premium, or government inefficiently will take on new functions.

This study advances the constructive implication of technological injections of new dynamic variables in production, increase consumers' surplus, expand producers' surplus, and contribute to the societal benefits. Statistical analysis of the United States economy, 1963-2004, will study the measurement of specific inputs for the influences of comparative data on the overall production process. Furthermore, graphical presentation, game theory, set theory, and economic welfare theory will support the constructive arguments for developing nations that adopt positive and constructive strategies. These will encourage a balance and globally beneficial adoptions of appropriate technologies.

Notes

[1] Ian Urbina, “In Gulf, It was Unclear Who was in Charge of Rig.” New York Times, June 5, 2010, http://www.nytimes.com/2010/06/06/us/06rig.html?pagewanted=print

[2] Mark Thomson, “Don't Bet on the Military to Plug the BP Leak,” Time, June 15/2010, http://www.time.com/time/printout/0,8816,1996601,00.html

[3] Tue Dec. 10, 9:40 AM, ET, London (Reuters) - Europe's leading scientists criticized the European Union's science policies, calling for “funding to curb further brain drain to the United States.”

[4] BBC News, “Europe moving in R&D slow lane,” http://news.bbc.co.uk/2/hi/science/nature/4697883.stm, (Published: 2005/07/20 09:13:47 GMT), UK.

[5] Dynamic Oscillatory Implosive Robotic-ism deserves scrutiny.

CHAPTER 2

DERIVED DEMAND FOR TECHNOLOGIES

The derived demand for technologically advanced goods and services is the sum of segmental demands for goods and services with embodied and disembodied technology by consumers and other producers. Moreover, it is the sum of the derived demand for technological progress in the production process, and for capital in use and innovation, by entrepreneurs and producers. Then, the demand for inventiveness leads to the demand for inventions, research, and scientific activities.[1] That is, theoretical inducements (through market-mechanism) motivate the entrepreneurs, innovators, and inventors.[2] This may prove to be a difficult argument, in cases where disconnections persist between market rewards and individual creations.

This segment of the economy determines the ultimate success or failure of technologies supplying goods and services. The most dominant purchasing power (70-90 percent) of the gross national product makes up the consumption in a market economy. Producers are the other economic-agents, utilizing technological embodied and disembodied goods and services used in production of other goods and services, as long as there are demands for the causal byproducts.

Despite the importance of technological advancements (embodied and disembodied in human and nonhuman capital) in development of human history of economic growth, this is never the main economic reason behind the demand for them.

The demand for products and services by consumers and producers combine to make up the formidable derived demand for technological advancements.

Reduced Price and Techno-Progress

Consumers and producers both respond positively when they can use any new product as a substitute for a higher-priced commodity, service, and input, or if they receive a perceived improvement subject to their financial constraints. This is especially useful if the new products from technological advancement increase employment, and their prices decrease; therefore, there are double boosts to income.

Computer uses and their involvement in work have exploded over the last three decades. However, the government licenses the software company to produce computer software, which operates personal-computer businesses. That is a government-granted monopoly. Therefore, the price of software at $80 is double the competitive market value of $40. This may not appear to have grave impacts on the market. However, a large portion of the population can be shut out of learning, communications (internet access and web cables), and participation in government for the additional $40 per product. Two decades later, it takes from $90 to $600 and additional monthly fees to connect to the system, so large numbers of the people are out of the system. The 50 percent difference per product as tax revenue can properly fund public education, retrain the displaced workers. This could have happened instead of exorbitant salaries, instead of keeping the population in ignorance for political gains or expediencies, while catering and expounding the great constituency of unsustainable hubris. In the balance, the owners of patents or copyrights would have become multibillionaires at a slower rate, assuming systemically,

that pilgrims and fraud did not dispossess them, too. Alas, if shareholders had more of a voice, or a share in such fortune building initially, perhaps the negative externalities would have less influence on market disequilibrium. However, we see when governments fall short of tax revenue and adequate regulations, good will of multibillionaires can compensate for national and international deficiencies, caused by inadequate revenue (wage) distributions, but sparingly.

The price of a personal computer has dropped from unaffordable to semi-reasonable to a price for a personal computer or laptop under $500. However, the same does not apply yet to the common languages (software) of the Personal Computers hard-wares. There is downward pressure on those prices too.

Consumer Demand

The consumer utility function guides the most dominant purchasing power of the economy. Thus, consumers' sets of budget constraints will induce them to buy the kinds of goods and services that will put them on their highest possible utility curves. The byproducts of the process of technological advancements (invention, innovation, and capital in use) must meet the same criteria. That is, the new goods or services at the lowest possible prices, within the consumer budget, allows for attainment of a higher indifference curve.

Alternatively, producers will make low-price substitutes to fill up the consumption basket, unless the restrictive elasticity of demand limits the consumers' options. The producers can make such novelty items. They would modify the taste of the consumers. In addition, the new items will be within consumers' income constraints. The

prices of new items must be within the budget that consumers have to purchase them.

Techno-advanced Price Reductions of Commodities

The most recent and vivid example of a modern consumer product, the result of technological advancements of many combined scientific fields, is the personal computer. Computers in 1970s were a huge many-roomed multiple mess of wires, bulbs, and electronic circuitries, costing many times the annual revenue of the biggest institutions and even small countries. Most households and students had no access to them. Comparatively, in the new millennium, with a nicely packaged mix of computer chips, micro technologies and miniaturization, and few short cables, a desktop personal computer is available, priced less than the average monthly salaries of an employed worker in the advanced economies. If mobility and connectivity were required essentials for the information age workers' force, laptop computers (I Pads, and cell phones) and wireless communication have unplugged and mobilized the office workers, too.

Clearly, for the consumers who prefer such an item, the technological innovation embodied and disembodied in the personal computer has made it possible in two decades to have something they could not have before. They are still able to buy other items in their consumption basket.[3] The producers and suppliers also have a new tool added to their production mobilizations. They did not have that before. There are still high-priced computer systems in the world, but the choices and the alternatives have increased at the end of this technological advancements process for majority of the consumers and producers in most economies.

Another vivid example is the price-impact of inventions, innovations, and

capital in use related to agriculture. In the history of early colonial America (the eighteenth century), the same universal technologies of that age were used in agriculture production. The agriculture byproducts were mostly for familial consumption.[4] In the Europe of the eighteenth century and in present rural India, like most rural agrarian life of developing nations, it takes 50 percent of income to obtain food.[5] By contrast, food budget will take 10 to 20 percent of the average income of an employed worker in an advanced economy. That will leave many resources for education and improvements in these economies, by consumers-workers, by producers, and by governments.

Techno-advanced Price Reductions of Substitutes

There are large numbers of commodities in most consumers' baskets, substitute for other pricy items, as seasonal price changes occur. Consumers' demands for the substitutes increase, as technological advances make these substitutes cheaper.

The present consumer demand for home central heating and air conditioning systems has increased consumer demand for natural gas versus mined coal, or firewood in a Robinson Crusoe model. In fact, demand for a commodity (cable, for example) will change directly (increase or decrease) if a technological advancement changes the price (increase or decrease) of a substitute commodity (VCR, video cast recorder, for example). The cross elasticity of relative demand for a television would be positive with respect to the relative techno-advance price change of the VCR.[6] Dynamically, this aspect of technological advancement has gradually nudged humanity away from the Malthusian nihilism.

Techno-advanced Price Reductions of Complements

Technological progress also affects consumer demand of complements. These goods are commodities used in relative fixed percentages of demands for each other. One example is hamburger meat and hamburger buns. So, if the price of meat (beef) goes down, demand for hamburger and buns increase. The prices of ham or steak also go down. Then, as competitive commodities, demand for poultry will moderate.

The demand for television sets will increase if innovational changes reduce the costs of electricity. Alternatively, the demand for a VCR tapes change if the price of the videocassette recorders changes. The cross elasticity of relative demand for VCR tapes quantities would be negative, with respect to the relative techno-advance price changes of the video cassettes.

Techno-advancements and Consumer Taste

In earlier history of most advanced economies, in most developing nations now, unless consumers taste changes, much of the byproducts of technological progress may not meet sufficient demand to sustain their development and use.

A large set of exogenous variables (sociological: education, culture, politics, theology) to economics may affect the endogenous variable demands, via consumer tastes, to halt or expedite technological progress. This is one reason to explain the faster rate of technological change in the utilitarian colonial America versus British custom-tailored demand for consumer items.[7] The existence of the phenomenon shifts much of the earlier focus of inducement for innovation adoptions, from producers' isolation and suppliers' base to a demand and supply base inducement.[8]

The initial geographic dispersion of familial, rural America with accumulated land and livestock imposed certain needs for transportation and information. The general store, Montgomery Ward and Sears and Roebuck ordering catalogues, and the likeness of Ford's Model -T to horse buggies all preceded modern advertisement and auto industries.[9]

The importance of consumer taste has led to a multibillion-dollar producer-supported advertisement industry. The purpose of the public relation advertisement industry is to modify taste and preference of consumers, and thus consumer demand for goods and services.

Many sets of psychological and communication innovations are so financed to modify consumer demand. Another way of looking at this is to remember your first computer and those floppy disks that you used to exchange and save files. Now, look at your laptop, and new hard disk storage of 80 GB (gigabytes), and CD storage disks with 700 KB (kilobytes), to new terabytes external storage disks; if only you stayed in college to learn something to write about the globe in flames around you. Well, it is never too late! Sadly, the globe still is in need.

It is important that when a culture has taken an adoptive and utilitarian position in her tastes and preferences toward an innovation, such an innovational progress has taken effect. In way of explanation, an adoptive culture may have reduced the risk factors facing entrepreneurs on their way of supplying novel ideas or products.

It makes sense not to increase risks in presenting new ideas if every new idea has a 50/50 chance of either getting you killed or bankrupt. However, if the novel

idea gives you the same probability for larger financial rewards or some financial losses, you will risk more often. This also may explain the relative economic growth of more democratic economies, with advanced legal institutions, which respect property rights.

Techno-advancements and Consumer Income

One of the most important byproducts of technological progress and availability of cheaper goods and services is the relative increase in disposable income to consume and invest more. The choices made will directly affect the future income and level of living. Take the example of the reduced cost of food in an advanced economy. Assuming that 20 percent of workers' disposable income pays for food, a large sum of individual resources can fund his or her shelter, entertainment, and improvements in his consumption basket. Perhaps with 80 to 90 percent of consumption expenditure of the disposable income gone, it leaves 10 percent for education of the household as an investment, or saving for future consumption and investments. In most economies, firms or governments pay for the health of workers (their population), because it plays such a big role in the competitive productivity edge most advanced economies are seeking. Education, basic and increasingly job and life functionality-targeted retraining, is also gaining recognition due to its role in productivity increases in internationally competitive markets. If there is such a large allocation of available income for consumptive goods and services (entertainment) over investment in education (80 over 10 percent), one should also see a re-allocation of resources and national focus. Such misallocation of the resources and national focus are not hard to find.[10] The comparative resource misallocation of funding, including salaries, for educators and related fields versus athletes and executives

is profound. Many excellent publications exist about the American high-priced athletic ventures (multimillion-dollar contracts). That, next to the massive underfunding of social program related to retraining and education (and the United States average income of $42,600.00 [2002 levels]), and the salary and benefit packages of United States business executives, (500 times the average income), and current legalities. Try to keep a straight face, when the next right-wing moralists tell you we should copy current business models for educational improvement models. However, consumers are also supplying work input to the production process, which is becoming more responsive to an innovation-using ever more competitive international market.

The producers would only pay high income to the workers who are constantly increasing their self-embodied human capital by education and retraining, with one exception, the educators. Perhaps it is an easy skip from this logical need for skilled workers to the paradoxical and illogical argument that robotization will replace the need for workers. While this is no longer a technological impossibility and aside from the politics, such supply side dream-logic confronts the basic need for workers' income-demand, thus workers' demands to buy the products. Without workers' disposable income in all segments of the economy, who can afford the high-priced innovational junk supplied? Who will pay for the great humanitarian services, or the cross generational obligations? Two examples are the social security and entitlements of geriatrics portion of the population, and the education of our youth. Alas, mindless market mechanisms have done significant damage, before market monitors or governmental interventions have forced corrective responses. The modifications (by rules and laws) will control the

damages, and the extreme costs of negative externalities. Since the rate of technological changes have sped up enough, the potential for such deviations and externalities become more important.

The technology products like other commodities can be either normal or inferior goods. Since the dynamic aspect is the issue, the innovation byproducts should initially be a normal good, and later, an inferior good.[11] That is, the demand for such a commodity should increase with increases in income, then fall. Therefore, the income elasticity for the number sold with respect to real disposable personal income over time is positive for new products but negative when they become obsolete or other novel and useful commodities replace them.

For the most part, 1940-1970 has been an important innovational period for passenger cars; initially uncomfortable, now a balance of electrical, combustion engine, electronic, and other multi-systems of technological advancements have been a prize-purchase of the American consumer durables.

In Table 1, the income elasticity of real disposable personal income and number of passenger cars is studied. This table also reflects the positive attitude of consumers about the technology embodied and disembodied in the automobile.

The application of the same economic measurements to a number of agricultural products is even more interesting. The positive amount of farmers' income spent in each category shows the advent of agricultural mechanization versus utility of animals in agricultural production. The former has been increasing, and the latter declining and diminishing at an increasing rate, over time.

Table 1. Income elasticity of consumers' cars.

Year	1940-50	1950-60	1960-70
Elasticity	3.95	.004	1.52

Note: Real (1972) dollar disposable personal income and numbers of passenger cars sold are in these calculations.
Sources are Historical Statistic of the U.S., 1967; Statistical Abstract of the U.S.A, 1967; Economic Report of the President, 1984.

The more real disposable personal income of American agriculture-based families increased, the more they spent on new machinery that was more productive, and the less they spent on traditional modus operandi on farms.

In Table 2, the income elasticity of consumers for these numbers of agricultural products show a positive index and peak for complementary new products and a negative ebb in index for the substitute or obsolete product.

Corn pickers and combines became self-mobile, and mortised as part of innovational change in agricultural machineries. Their complementary relations with tractors changed. Their income elasticity data for (1945-50) show that. The use of corn pickers versus combines for small grain also presents a fundamental preference of the consumers and producers of certain crop over other produce. The extensive use of corn in the USA economy for food, beverages, and feed is reflected in the two-for-one ratio of its elasticity over combines. In a nation that uses wheat, barley, and other small grains in food, beverages, and feed productions, their elasticity would dominate.

Table 2. Income elasticity of innovational products.

Years	IE: DI & Tractors	IE: DI & Combines	IE: DI & Corn Pickers	IE: DI & Mules, Horses
1940-45	1.3	2.5	1	-0.4
1945-50	6	12	23	-4.7
1950-55	1.6	2	3	-2.5
1955-60	0.5	0.4	1	-1
1960-65	0.08	-0.5	-0.5	N/A

Note: Real (1972 dollar) disposable personal income and numbers of farm animals and machinery are in these calculations.
Agricultural Statistics, 1967.
Economic Report of the President, 1984.

Since the percentage of people on the farm also declined for larger-scale operations, urbanization, and international suppliers, the indices also change for some innovational machinery over time.

Producer Demand

Producers will be motivated to take risks, borrow, and invest in the uncertain outcomes of technological advancements, if they perceive some profit potential from the above-mentioned vast consumer market demand for innovational and novel

products. The profit formula is profit equals revenues from sale of byproducts less the costs of production.

The producers must find customers or other producers to sell more byproducts to them in order to increase their own revenues. Better products and new innovational methods to produce them cheaper also help. If older conventional commodities are produced better and cheaper, that helps, too. However, for the reduction in costs, the producers must have cheaper and more productive input or a cheaper alternative to his present input or a better combination of input to produce more, means better production techniques to reduce costs. The farm producers purchased innovative tractors, corn-pickers, and combines to produce corn, wheat, and other farm products for others (like bread makers, ethanol and liquor industries). They comprise different market demands for novel products used in production of their crops.

Increases in economic activities in different businesses induce more concentration of innovational work. The increases in international demand for electronic imports from Japan have followed increases in Japanese patents in electronics.[12] Increase in the commercial activities precedes the patents.[13] Changes in family size, urban-rural mixes, and economic growth, are among the variables that influence profitability-risk potentials of technological progress.[14] As with some other changes in population growth, and the age compositions, per capita income growth, changes in related innovations affect demand for innovational works. The number and quality of graduates in certain educational fields will increase economic activities in those fields, too.

Producer Demand and Techno-advanced Price Reductions

Producers and entrepreneurs facing the same profit formula and risk prospects tend to choose least-costs appropriate production techniques. Since they respond to market price mechanisms, they would upgrade their production methods with respect to relative prices.

Thus, American homebuilders would use more wood relative to the British or Middle East builders, which use more bricks or masonry (clay-straws-gypsum mix, cement mix, cooked clay).[15]

Naturally, more invention may target least-resource cost appropriate techniques to guide their innovational talents. All modern high rises in all corners of the world will require the use of steel, wirings, and modern materials. Unskilled workers and marginal products for landscape, and folklore and regional art, are often local.

Institutional Demands-induced Techno-progress

Governments (more during wartimes), the universities, and the corporations now regularly finance research and development.

It is true that in times of war, military needs induce many such demand-pull inventions.[16] While the institutions may have a general wishes and wish lists for certain technological advancements as supply-push invention, they do not have direct control on the creation process of inventions. Their means of directing inventions is freedom to do research, financing the researcher or a team of researchers, and collecting relevant information for the teams, reducing risks, and increasing rewards and incentives. In the case of governments, this means allowing for stable but responsive systems of governing,

allowing for the innovative changes to take place. They are also financially able to recover, in cases of negative externalities of technological progress, and in cases of market mechanism failure.

Some of these factors are in use already. Government regulations applied in patent systems and copyrights protect the inventors and other creativity; antitrust laws reduce monopoly market blocking.

The constitution assigns the task of copyright laws and protections to congress, the important task of fair use to criticize, to rebuild, to transform, or to correct erroneous science is also in the law. Therefore, scholars will challenge or upgrade bad or trite and outdated works constantly. Without such latitudes and protections, no new or important discoveries will be magically appearing in any culture.

The danger looms that well funded lobbied laws reflecting the interests of multibillion-dollar monopolies, void of the voices of others, including scientists, can easily legalize theft of individuals, scientists, writers, and creators' services. This will cook the golden goose of creativity in an economy that still does not fully understand this process.

Some military and military backed cooperation finance institutions for their inventive productivity and the diffusions of products (basic and applied research). DOD and NASA are a few famed examples.

Government support of civilian technological progress also exists, whether it guarantees to buy end products or in winning of contracts. An example would be the financing of some avionic innovations of post-WWII by the United States and other Western economies.

Governments can be internal to the economic process. Central banks, Federal Reserve, treasuries, and department of commerce can impose regulations. Trade regulations may play a far more pivotal role in investments or imports of appropriate technologies and the related enhancement of market mechanisms, yet unexplored. They can also transform ideas to product phases of product developments.

Think of early versions of modern computers, or the huge gray block cell phones of the 1980s. They had to go through the same processes initially. Later, their newer version, the lighter, more sophisticated versions, had to go through the same process to advance. The consumers responded to the innovational alterations and purchased the upgraded ones. That is why we do not drive Model- T Fords, unless to auto-shows. Moreover, the hand held phones, cell phones, are now televisions, clocks, planners, calendars, secretaries, dynamic map libraries and road maps, and minicomputers. Options such as tasers can also enhance them as security tools.

Figure 1 shows a stochastic dynamic invention-innovation model. The first half is about conversion of ideas into inventions by individuals. The second part is about complex synthesis and synchronization of ideas and inventions by individuals or teams into initial marketable products. The dynamic phases contribute in circularity and continuum. The combination of disjointed half donuts, into full donuts, and disassembling and reassembling them until producing more perfected donuts are symbolic representations of ideas in the invention process. Ideas can be adjustments to new conditions, regulations, and laws, presented by different arrows. They are imposed externally, or they are selected internally, for modification of the product along the way.

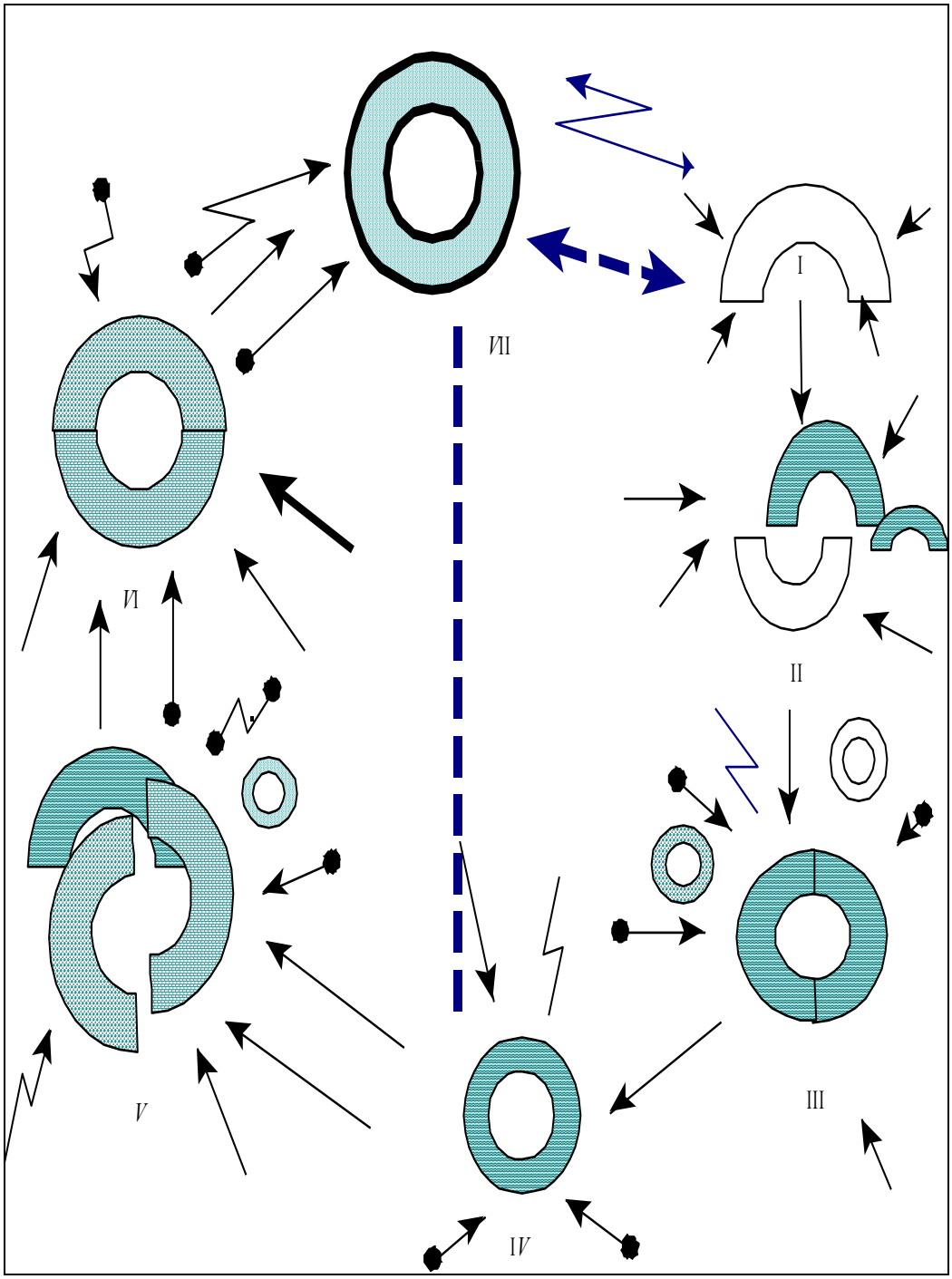

Figure 1. Stochastic dynamic model of conversion of ideas to inventions.

The complexities of Figure 1 are explained in the following chapter. The new discovery is about the dynamic change and the sustainability it interjects in the processes of production.

In Figure 1, half circles, full circles, and morphed circles reflect incomplete projects, products, untested scientific propositions, and hypotheses. The arrows reflect practitioners' ideas to improve different unfinished entities. Closed or loaded arrows with tails are more completed or more skilled interventions and additions to the projects. The zigzags and tailed zigzags are clear rules and educated regulations. They would encourage and advance the cause or progression of the innovations. At different stages, we see that whole circles dismantle and morph into new and different circles and a final larger well-defined circle.

Traditionally, that is often how innovation had stopped. Yet in scientific reality, scientific methodology, and in product differentiations, and in further evolutions we see no such termination markers. The dynamic process goes around the circular or spherical path, usually continuously. That is where this dissertation redefines the traditional understanding of the discovery process.

In these findings, and the related econometrics, testing and retesting of technological parameters for this study, the research went on for multiple runs around these steps of continuum. Important aspects of the model are dynamic. For example, laws change constantly. Producers have to update and upgrade with respect to new laws. Production techniques, new technologies, new skills, are also injections into development phases. Therefore, at each turn, new elements will formulate the process.

Notes

[1] Colin G. Thirtle, and V. W. Ruttan, *The Role of Demand and Supply in the Generation and Diffusion of Technological Change* (Switzerland: Harwood Academic Publishers, 1987), 8

[2] Charles Kennedy and A. P. Thirlwall, "Surveys in Applied Economics: Technological Progress," *The Economic Journal* (March 1972): 12

[3] James Patrick Gander, *Technological Change and Raw Materials*, (Utah: Bureau of Economic and Business Research, University of Utah, 1977), 94-95.

[4] Nathan Rosenberg, *Technology and American Economic Growth* (New York: M. E. Sharpe, Inc., 1972), 3, 43-44, 48

[5] Theodore W. Schultz, *Investing in People* (Berkeley: University of California Press, 1981), 4

[6] George J. Stigler, *The Theory of Price*, 3rd ed. (New York: The Macmillan Company, 1966), 31-34.

[7] The acceptance of standardized machine-made but quality products in America allowed for the customer versus producer-based inducement for technological progress and mechanization (Rosenberg, 1972. 43-44).

[8] Joseph A. Schumpeter, *Business Cycles*, Vol. 1 (New York: McGraw Hill Book Company, Inc, 1939), 73

[9] Rosenberg, 1972, 48

[10] Bahman Fakhraie, "Hollowing Headless Nations: The Need to Invest in Public Education, Under 1980s International Economic Conditions." (Research paper, University of Utah, 1988)

[11] The percentage change in quantity sold is relative to the percentage change in real disposable personal income. The more standard definition of normal and inferior goods and income elasticity is available in economic literature (Stigler: 1966. 33-34).

[12] Jacob Schmookler, *Invention and Economic Growth* (Massachusetts: Harvard University Press, 1966). The change in economic activity in an industry positively correlates to relevant changes in patents, with time delay.

[13] Schmookler, 1966

[14] Rosenberg, 1972, 48

[15] Schmookler, 1966, 55

[16] Ibid., 42. The Manhattan Project yielded one of the most complex inventions of human history, access to atomic energy. Its good and bad potentials are still unfolding. The invention of synthetic rubber instead of South East Asian natural rubber is another example.

CHAPTER 3

THE SUPPLY OF TECHNOLOGICAL PROGRESS

The supplies of technological advancements are classified as two initial types. Definition one is the set of knowledge, which must advance as basic and applied scientific knowledge and inventions. Definition two is the set of skills and qualitative improvements in basic inventions developed in productions, in order to apply them in the process of new productions. Innovational changes and improvements in forms of new capital (human and nonhuman capital, i.e., new machines and tools) are of the latter kind.

Thus, the more comprehensive definition of technological advancements is used.[1] That is, the progress of a set of knowledge and skills used in new production or productions of new capital (human and nonhuman), new goods and services. The new hybrid grain or pest-resistant seeds, new marketing, managerial skills, financial development, or another electronic time saver would meet the definition of technological progress.[2] The post-Schumpeterian focus of economists on the postinnovational phase of production (and solely creative destruction) clouded some judgments. The misdirection leads resource allocation away from constructive phases of appropriate technological progress and the assumptive requirements of economies for sustainable growth and development, as defined in this study.

For an invention to end up in the form of a final novel product (good or service) or a new production process, it must go through the qualitative process of

innovations and capital in use phases.[3] Schumpeter excluded invention by definition from his model, stating innovation is possible (in duplication) without new inventions. However, P. A. Usher revised his book, published after Schumpeter's death, and made such exclusion unnecessary. Thus, if the patent-holder innovator is unable to use it in production, other agents will do so after purchase of legal rights to it, because of new or different market-inducement they see. That is, innovators and scientists must first supply the new idea-invention. Then, innovators and entrepreneurs, small businesses, and immigrant business owners would take that invention or a new combination of older inventions and apply them (as new capital in use) to supply new products, or to supply a new production process to produce an old product better or cheaper. This creates new demand for the supplied new idea, while maintaining a stream of income (by wage redistributive mechanism) to sustain the production process.

Inventive Process and Supply and Techno-advancements

Two factors explain the contribution of the inventive process to the supply of technological progress:

1. Synthesizing the practitioners' methods with the scientific-methodology in the invention process was productive.
2. Defining and discovering of the new inventive process.

Internal logic of scientific discovery reflects motives for understanding, while practitioners' motives for technological change were for use in production.[4] Historically, practitioners would discover their skills without knowing the scientific logic of them. Extensive innovational changes can take place without any new inventions, often

based on new combinations of old inventions, or adoption of on-the-job parishioners' skills. However, the syntheses of technology and scientific methods have expedited the rate of technological innovation. Furthermore, the complexities of new discoveries are traditionally concentrated in the research of applied science, where teams of researchers invest financial and time resources focused on certain problems.[5] Generally, where the expected benefits and probability of enough profits induced resource allocations to the targeted-problems, the rate of relevant technological advancements tend to increase.[6] In fact, over the last two decades, the federal government and industries spent more than universities on research and development programs. Next, the inventive process is presented, which can explain the emergence of a new idea and the development of ideas to inventions, innovations, and capital in use as a process of supplying technological progress.

Emergence of Novel Ideas

Anthropologists, historians, and sociologists have studied the subject of novel ideas with much fascination, before applied scientists, economists, and econometricians. Cultivation of constantly coming up with ideas is not as common as everyone assumes. Perhaps, because the mind is always busy, some presume all their mental thought-dribbles are great ideas. Training idea-developments into useful patterns of products through inventions-innovation is truly the essence that makes wealth of nations a dynamic recurring science, if the nations finally grasp the meaning of such processes and how to cultivate them. Some cultures and nations have learned to cultivate such endeavors in themselves, and the immigrants in such cultures contribute and flourish accordingly.

They also cultivate the processes. Some cultures and nations choose poorly (sometimes suddenly in reaction to internal or external shocks), and they implode oscillating, in falling cascades. They fear and shun any new ideas, and the immigrants who may bring them the new processes (and labor and capital resources). The new mechanisms inducing changes dissipate, too. They even institutionalize such negative behaviors in counter-productive laws. Historically, such cultures wither and die or they are losing to invaders; or they stay stagnant, while the world zooms past them. In recent history, such cultures are clueless and their populations see waves of progressive technologies pass by them. These afflictions have fallen on many countries and cultures in different times. It has happened to cultures in different times, with different kinds of religions. In addition, exogenous forces have imposed it on some cultures or nations.

The Transcendentalist Approach

Rare geniuses gifted humanity with their intuitive acts and novel ideas, with mystical and inspirational attributes only they could supply.[7]

For most of human history, ancient cultures guarded their practical knowledge; they passed them on from father to son, or inside temples from Magi to Magi and rare chosen apprentices. Theologically, high-ranking religious peoples were trusted with them. Secularly essential truths passed to inspired aspirants as people of rare natural gifts.

The Persian princes (6 to 16 BC) in line for the crown had to undergo a ceremonial ritual designed to reduce their numbers, before they were trusted with the governance methodologies and high office. They would attack lion prides with short

swords and lance in small royal numbers. The process of supplying ideas would become implausible if the lives of our scholars and students, or even creators of bad books, talk radio, movies, and extreme left or right strategies, were at risk. They would not come forth if they did time in lion cages for their new questionable primal screams or bad ideas.[8]

The market place is a financial lion cage for all bad ideas. Nothing as lethal as lion cages; however, if you have no job and no health insurance, it becomes a matter of polemic indifference, between immediate termination versus the prolonged inevitability.

Ralph Waldo Emerson (1803-1882), as leader of New England Transcendentalism, explained that Emmanuel Kant (1724-1804) identified "transcendental forms" as an important class of ideas, come by intuitive thoughts rather than experience.[9] The approach failed to explain the cumulative additions to collected human knowledge and critical reason over the historical long run.

The insightful acts are not as rare or person-specific as once thought. In addition, specific problem preconditioning may increase the possibility of such relevant acts of insights repeating, if not the one occasional big idea.

The Mechanistic Approach

The process of creation of inventive ideas is an accumulation of small parts or portions of the whole idea accumulated over a long time, and then put together in a much larger useful whole of an idea.[10] The stress, tension generated out of the need for a new idea would help make the process of creating it happen.[11] Given advancement in knowledge and social relations and the cumulative synthesis process, these accumulate and puzzle together the whole of an inventive idea. This approach has been credited for, one,

the cumulative synthesis of many smaller parts, and two, for presenting it as a long process.[12] However, this approach does not present the details of the process. The explanation is underrating the role of inventors. It does not have a deterministic certainty. The real industrial experiences do not show that degree of certitude.

The Cumulative Synthesis

The cumulative synthesis approach is the middle of the two extreme processes. It divides into two segments.

- One is the creation of individual insightful acts, may not be an inventive idea.
- Two, the cumulative synthesis process, is a combination of more insightful acts with many other ideas and parts toward forming a whole, having a more probable chance of being a strategic invention.

This would be the most likely process of creating inventive ideas. The associative synthesis of ideas would be concentrating and converging in this process. Alas, it will not explain the essential and continual fine-tuning characteristics essential to democratic processes intruding constantly in the process.

The Gestalt Theory

The Germanic Gestalt pattern is used to explain a formed whole whose parts belong together and have a quality to them in that organized whole, which is different from juxtaposing the same parts randomly. The founders of the Gestalt theory were three German psychologists: Max Wertheimer, Wolfgang Köhler, and Kurt Kafka.[13] Inventions, as whole-organized forms (Gestalten) are a massive synthesis of smaller whole-insightful

acts, are syntheses of other acts of insights.[14] The social process would yield us a close circle when initially there would be incomplete circles (i.e., David Kaz: proximity, closed forms). Kafka stated laws of maximum simplicity, regularity, and symmetry would help the stimuli to yield a good psychological organization (Gestalten).

Köhler experiments show a chimpanzee using a tool placed close to food to retrieve the food while no previous experience existed. Kafka identified the act given the setting of the stage as an act of insight. Arthur Koestler draws a parallel: Archimedes already had the problem in his head before his bath. Thus, the combined mental fields became one and the solution was not an invention, but found. Running nude was just for theatrical effect, or a marketing flare, and we are still writing about it.

Thus, by setting the initial proximal stimuli combined "in space and time" they would form a certain kind of predictable perceptual organization, that is, an act of insight.[15] Then, a social process for invention exists.

The initial social process for invention does not depend on mystical impossibilities. Nor, it depends on systematic determinism, and it can account for historical progression in mechanical technologies.

There are four sequential phases in the initial process of emergence of novel ideas or emergence of insightful acts.

- One: unfulfilled wants, needs, demands, or an incomplete pattern would initially present the problem. Thus, there is a need to focus the individuals' mind, to concentrate.
- Two: combining and collecting initial relevant information to satisfy the need

and fulfill the demand for new ideas. The practitioners use fumbling and trial and error at this stage, pure chance playing a big role in finding something new.[16] Later, the scientific method and organized experimentation added to the probability for success to lead to relevant acts of insight. However, not all conditions and information are available for all possible people. Moreover, people may be subject to number of forces that make them unsuccessful.

- Three: the relevant insightful acts present a solution. Nevertheless, the found-solution occurs by chance, so an exact timing of such activity is not possible, nor there are assurances that it would take place every time in a deterministic or mechanical fashion.
- Four: this phase is for critical study and revisions, thus mastery of the new idea. The new idea then is a "technique in thought or action."[17]

It becomes more important if it is useful with the rest of the experiences and cultural accumulations of the group. The accumulation of such events could then lead to inventions and the process of cumulative synthesis.

Primal needs for food and shelter are very basic demand, Gestalt psychologists noted. In the history of human development, the set of needs have evolved to more complex issues.

This can be a great start, but as an explanation, either it falls short of real life, or the importance of inventions have attracted much more resources and focus for economic reasons; either way, the regularity of applications and existence of inventions and innovation in modern economies requires this further study.

The Accumulation of Ideas and Cumulative Synthesis

Accumulation of ideas and improvements in communication, cross-cultural and over time, increased the rate of cumulative progress of ideas. The process of organizing the related ideas to a relative whole, constitutes an invention, is the cumulative synthesis process.[18] While V. W. Ruttan identified the second and fourth steps needed in innovation, there are no distinctions presented between the processes (the emergence of a novel thing, or cumulative synthesis). The same was also true about Mansfield's presentation.[19] A. P. Usher found the cumulative synthesis to be the source of any inventive creations. Nevertheless, the dynamic cumulative synthesis would be even more likely to yield appropriate innovation. It is a collection of the four steps in emergence of novel ideas, combined with a large number of old and new inventions, ideas, and experiences into a massive synthesis process.

This process explains how the scientific need for pure understanding and discovery of the supply-push argument combines with the institutional and economic need of the demand-pull argument, in formation of a strategic invention.[20] That is, the scientists' need for discovery can play a role in the desire to complete the incomplete pattern in the process. In addition, it explains how the institutional funding and economic needs become relevant to the setting up of research teams and are internalized to the social process of inventions. The massive synthesis process is to be used by practitioners, inventors, innovators, and scientists alike.[21] However, the injections of practical exogenous corrective or adoptive signals are unknown in these processes or steps. We can deduce the critical revision phase may be for such refinement.

The four steps of cumulative synthesis are:

- The perception of incomplete pattern phase exists. This could be the result of innovators' need to use or the scientific need to understand or the institutional area of focus. While individualized means of measurable inventions have been on the decline, individuals (even in team research) play the unique role in the process.
- Set up of stage phase. The recent requirement for research is more complex. The individual researchers have large sums of human capital invested in them. They are self-financed or state or federal capital is invested in them. Then, the institutional infrastructures for the research to take place and needed equipment are parts of nonhuman capital for the setting-up stage.[22] Thus, the financial needs of researchers and the institutions are paid. In addition, societal allocation of resources become deterministic, when international competition is involved. However, all of the preliminaries should be prepared, and all the data and information should be pointing in the direction of new invention. In case of a major invention, all relevant inventions would be already available. Industrial research laboratories and agricultural experiments stations are two American examples. They have utilized these processes. The establishment of experimental laboratories was a clear recognition of benefit from the applied processes.[23] Alas, regardless of Henry Ford's background as a bicycle mechanic and availability of information on horse buggies, it was Henry Ford and none other who invented, innovated, and utilized resources in a unique way to make

the Model-T Ford car.

- The act of insight phase, as part of cumulative synthesis, implies a special act of insight combining other inventions and acts of insights. Thus, a more complex process requires some knowledge of previous inventions. A more complex learning process of previous knowledge assists the process. Henry Ford could understand and fix a bicycle. Bicycle repair induced no one else to invent the Model-T Ford.
- The critical revision and mastery phase is also a part of cumulative synthesis. Failures perform a historically important service. They are internalized by A. P. Usher as part of the process on creating novel things. There are inventions or scientific works already discovered, but not used or applied, because these potential discoveries never went through the fourth phase of the cumulative synthesis process. It could be after other inventions and future critical revisions that full mastery of newer inventions appear.

If we delay the revision phase for all modification, it may be too late in the process for many important changes. The modifications needed here are reflective of changes in modern economies to allow for financing the activities. They are both extensively costly and very risky, about their ultimate marketability.

The Dynamic Cumulative Invention Synthesis Process

They dynamic cumulative synthesis process would repeat the four steps, while the set of novel ideas and inventions are increasing over time.

A. P. Usher introduced the first and second phase as parts of the second

cycle. For important social achievement, more strategic inventions were required. He added the second phase in his later writing, as the data were accumulating in favor of approaches that are more dynamic.

The portion of savings will invest in new capital to generate more income. Newer savings, investments, and newer capital increase inventions. The dynamic cumulative synthesis looks at the role of added inventions in generating more inventions that are relevant. For example, the personal computer invention took place after relevant electronic inventions, use of digital numbers, and audio-visual communications were accessible inventions, before the earlier personal computers were there. Further inventions have added to the expanding base of personal computer knowledge. Besides the continuity of the process, the interdisciplinary discoveries, and disciplinary discoveries outside the field, have further increased the rate of technological progress.[24]

The firms recognized the potential benefit of this process. They internalized the process and allocated funds to finance it, as a part of research and development systems. There has been much public expression to fund sufficiently every endeavor to encourage maximum performance and drive optimality in these areas of technological advancements.

It is clear that the total research and development budgets of federal spending as the source of funding has declined approximately 10 percent. In each item, federal portion of the funding has declined. The total research and development federal funding portion has dropped as much as 10 percent; in the area of basic and applied research there are from 5 to 7 percent reductions; in developmental research and

development funding, another 7 to 10 percent reduction is noticeable.

It is important to restate, the global competition will determine dominant leadership, more than nondefense military budgets, in this area. Some arguments favor anti-immigration laws and delusional unconstitutional laws in name of enhancing chances for growth, among a canned list of misfortunes as they occur unabated, or are induced to occur. That would do little but shut off the capital mobility to the American economy, while baby boomers' portion of the population will explode, and wage earners and real wages remain unproductively too low.[25]

In a key area of the economy, the worker unions are confronting governments and semigovernment groups attack to erode their influences to maintain level of living of higher disposable income over time, hopefully for growing workers and not for the elitist few. When the minimum wages are occasionally raised 10 cents for the working poor, you hear political advocacy voices about the implosion of the economy and about the inflation it creates.

You will hear a rare few political voices and no sound laws to remedy against the looting of capital markets by the executives' wage-packages at more than 40 times, 100 times, 200 times, or even 500 times the national average income ($42,600 for 2002) of the American wage earners. It is astonishing that the first amendment and the fifth amendment are the only part of the USA constitution understood by the media, and the employees of the same and other executives. The monopoly centralism of media-industries thus subvert the right of petition from the population, even in a democracy.

Table 3 represents the categories of research and development funding. It is

Table 3. Total R and D funding and categories (in Millions of 1982).

Categories	1970	1975	1980	1985
Total R&D	62407	59883	73237	96999
Fed. as source %	57.1	51.7	47.2	47.9
% of GNP	2.6	2.2	2.3	2.7
Basic/total R&D %	13.7	13.7	13.5	12.9
Fed. as source %	70.2	69.2	70.2	65.7
Applied/total R&D %	21.9	22.0	22.2	22.6
Fed. as source %	60.2	57.4	55.5	53.1
Development/R&D %	64.4	64.1	64.3	64.5
Fed. as source %	55.4	48.5	42.6	45.0

Note: Total R&D includes basic, applied, and development funds.
Source: U.S. Bureau of the Census, *Statistical Abstract of the United States*, Washington, D. C.: 1989. 577.

important to realize that federal government as a percentage of funding for each category of research had reduced spending from 1970 to 1985 levels.

There are social benefits not accounted for in the private firms' returns or in the researchers' returns.[26] Therefore, there is a need for governments' allocation role to finance research. Table 3 shows the diminishing federal funding of research and development. In fact, the next table will show the value different advanced economies

have given the invention process in their economies by allocation of nondefense research and development funds to advancement of knowledge.

The media never saw the wage package of new privileged subclass jump from 10 times to 500 times more than the average American earnings in the two decades that it has been happening. Since the last half of the sixteen-century colonial Americas' working conditions of American Indians, slaved then freed Blacks, and indentured Whites, no such outrageous class division and poverty creations have gone unseen with such deliberations.[27] Not even the Hearst media empire was so blind, or deliberately stupefied, and self-censored in order to hide capital formation derailments of such colossal proportions. The fourth pillar of the constitutional democracy is vacuously destabilized. Therefore, the multimedia alternatives will rightly replace and complement it, overtly and permanently. Often, we read history to repeat our past mistakes, rather than to avoid them.

A sound policy would deal with the knowledge advancement funding needs. There is a need to meet the 50 percent funding gap (Table 4), so the U.S. can compete on an equal level. The advancement in knowledge will lead to the more innovational entities in the competitive international markets. They will take market shares. This is different from monopoly domination of markets, or incarceration and military industrial complex types of domination, which are drains on the economies, too expensive and too exclusive to be constructional modern growth models for economy rebuilding strategies. Since 1976, there were improvements. However, Table 4 should alert the comparative need for resources in advancement of knowledge as a step to technological advancements. Global competition is alive and well, and it applies in technological market places as well.

Table 4. Percent of nondefense R and D Funds for the advancement of knowledge.

Type	United States	United Kingdom	France	West Germany	Japan
Non-defense R&D to Advance Knowledge	8	37	37	58	56

Note: author calculated it from Mansfield's defense share percentages less 100. The data exclude U.S. general university funds. Dates cover 1974-75 Japan, 1976 U.K., and 1976-1977 U.S.
Percentage of nondefense R&D Funds for the advancement of knowledge in some advanced economies, 1976
Source: Mansfield, E., and others. *Technological Transfer, Productivity, and Economic Policy*, New York: W. W. Norton & Co., Inc., 1982. 193.
Science Indicators, 1978. Washington, D.C., National Science Foundation, 1979.

The experimental spirit part of entrepreneurship makes inventors or academic mavericks, are important and unique to the invention process, as entrepreneurs play an important role. They alone, or as a team, are those with the inventive-insightful acts. That is, their endowed human capital would specifically make them unique and valuable. The costs of the human capital, higher education, and training, books, educational and trade periodicals have increased above all others. However, all other costs of maintaining a family also have increased, as reflected in the growth of disposable income, gross national product (GNP), or inflation (consumer price index for inflation) , CPI. In addition, the relative pay of teachers, professors, and researchers have declined with respect to others.

Market signals misread entertainment values for social productive values, and thus pay accordingly. There is a definite allocation of private national resources, is

taking place contrary to the best longer run interests of the whole economy, as noted in this study. In fact, that is why education has become such a fundamental point of technological competition push for the future. However, no longer can a private, small-funded venture really turn around the national economy of any nation.[28] At least, they cannot affect it enough to meet, compete, and lead international class-multinationals, or the giant-industrial markets.

There is a current scientific evolution two decades or so old, in theoretical particle physics, formulating about the older subatomic (+) proton and (-) electron hypothesis, as essence of matter formations shifts to smaller entities, the ubiquitous neutrinos, of which an estimated trillions are suppose to pass through earth each day [and the possible counter neutrinos]. Now there is proof neutrinos have mass, courtesy of a Japanese $ 81 million, 10 billion yen investment in the project of (2002) Nobel Prize winner, Tokyo University physics Professor Masatoshiba Koshiba. In this project, to measure any energy particles that travel through the earth, huge pure water tanks (about 10 stories tall) called super- Kamiokande are stored under ground away from the sun's rays. Light measuring devices were placed in the bottom of these tanks.[29]

The potentials are great if even extremely small impacts on other subatomic particles exist, or energy release is measured. For example, the scientific community could measure material entropy due to neutrinos' mass bombardments, and find a solution to counter the material decay.

The microbiological implication of neutrinos' energy bombardments and their induced gene mutations can serve other academic fields. Did such an energy impact

contribute to multiple or diversified humanoid-origins, or was it only natural section with cave irradiative genetic mutations? Yet, other implication for theoretical physics can help us understand energy loading of subatomic elements enough to alter particles from oxygen to ozone, or even better yet, to reverse such a process. At this level, science no longer can happen on an individual financial capital alone, but individual knowledge-capital still is needed, and it is very productive. Scientific projects of this type are rare. In addition, it is rarer to have small economies that can afford to finance them. However, commercial-technological products may materialize up to three decades later, if ever, or later in some cases.

The institutions also know the motivations. The Economic Report of the President stated, "Thomas Edison, after unsuccessfully trying to sell his first invention (an automatic vote counter), vowed that he would work only on ideas for things that people would buy."[30] International protection of intellectual property rights was such an issue on the administration agenda.[31] The importance of the endeavors for economic growth, for job creation, for adoption to oscillatory economic needs, and stable operation of government, all add to the importance of this area of research and development in all economies. It is also important to realize that a sustainable dedicated effort is required, before investment in these fields come to economic fruition of these strategies to adopt technological progress. The developing nations have also increased resources to these endeavors. Large numbers of developing nations exist that have allocated increasing amounts of financial resources, and scientific person-hours. Table 5 shows the real per capita annual growth rate in government agriculture spending in these nations.

Table 5. Real per capita annual growth rate in government agriculture spending.

Countries	Gov. Av. Spend. `54-74	Scientific Man Years `54-74	GNP `75-85
Brazil	32	32	1.27
Columbia	2.5	11	1.58
India	5	2	2.52
Indonesia	62	115	1.25
Korea	11	4	8.23
Mexico	11	14	1.31
Malaysia	10	22	4.71
Pakistan	3.2	4.2	4.06
Sri Lanka	2	5.6	3.76
Taiwan	6	0.6	4.27
Thailand	15	13	4.27
Turkey	15	41	1.37

Note: Real per capita annual growth rate in government agriculture Spending. (71 U.S. $) and scientific man years and GNP (84 U.S. $) in developing nations
Population estimated from the U.S. Abstract
Source: Schultz, Theodore W. *Investing in People.* Berkeley: University of California Press, 1981. 50-51
Boyce, J. K. & Evenson, R. E. *Agricultural Research and Extension Programs*. New York: Agricultural Development Council, 1975. Appendix II
U.S. Bureau of Census, *Statistical Abstract of the United States.* Washington, D.C.: 1989. 822.

The real per capital growth rate per year of expenditures in agricultural research was 28 percent in the Islamic Republic of Iran from 1959 to 1974. The scientist person- year per capital per annum growth rate was 4.4 percent.[32] Other nations will duplicate the process, as new discoveries show the importance of science in the process of inventive and innovative synthesis. The extended explanation of dynamic invention cumulative synthesis process was, to restate:

- One: it is organized, and to some degree more continual than first thought.
- Two: in the case of institutional and mechanical inventions, they are patentable, and the creative and scientific works have copyright. The invention-base set (basic knowledge and creative works) is increasing with their potential uses.
- Three: make explicit the unique value of the inventors, researchers, experimenters, and scientists with the creative human capital to this process of dynamic creative (inventive) cumulative synthesis.
- Four: legal protection of their ownerships and property rights, and agricultural productivity will affect positively, the future productivity in this area.
- Five: the intellectual property ownership rights of the individual are opposite to those of some political and financial powerful interests, or some institutions and governments.

Therefore, the inventors' roles are valuable to the whole of human societies. Specifically, there is a law targeted by the institutional interests (PACs: political action committees) that aims to pass the right of ownership of intellectual property rights (i.e., copyrights, etc.) from the creators to the institutions where they are working as part of

labor salary contracts and in addition to their works performed for hire. This new version of intellectual enslavement belongs to the historical dumpster, next to the unfortunate communal agro-productivity experiments of our starving international neighbors. It is a direct attack on inventive-productivity motivation. There has been a decided shift away from rights of ownership to institutional control. We will find that to be an intellectual dead end for dynamic societies depending on individual invention energies, as much as any advanced economy must depend on such inventions and multitudes of creative solutions of different kinds.

Innovation Process and Techno-progress

The process is a special class of dynamic cumulative synthesis process, is not in J. A. Schumpeter's theory of innovation.[33]

In this study with a new dynamic cumulative innovational synthesis (DCIS), the speed and direction of innovation are point of focus; this is different from the dynamic invention cumulative synthesis process. The dynamic aspect of the added dimensions encourages the prerequisite activities that will induce greater productivity. This is not a self-generating automation. It is not a self-deterministic cookbook to innovate. Given that there is no guarantee, an increased probability of breakthroughs exist. This quotation of V. W. Ruttan clears up some issues:

> "The focus of conscious effort to affect the speed or direction of innovation centers around the second and fourth steps in the process as outlined by Usher–in setting the stage and in critical revision. By consciously bringing together the elements of solution–by creating the appropriate research environment–the stage can be set in such a manner that fewer elements are left to chance."[34]

Schumpeter details this in the planning phase of what is in J. A. Schumpeter's theory of innovation.[35] Economic agents study the old and new inventions, innovations, insightful acts, and different sets of economic feasibility sets in order to establish the potentials for a new production function.[36]

Therefore, in planning for new factories and new equipment, new innovative firms and old innovation-generating firms, there is a need for an entrepreneurial spirits in risk-taking (other than financial risk-taking, unless new ventures are self-financed), because the experimental spirit are essential for the innovational process. Alas, the formulation fails without planning. The phenomenon of new ideas, like the computer microchips, will not evolve into the industry wide computerization of modern business, governments, and educations without any significant a priori stepwise road maps for its evolution.

In the design and building of new factories and rebuilding of older ones, there exists the chance for the adoption of cost-reducing innovations and available inventions. Two cases require more explanation: the issue of duplication of factories, and the replacement of old parts of a factory, which may not include innovation.

The duplication of factories involved innovation. It occurs at the early part of the diffusion and adoption phase of innovation. It is in a new market, region, and country. And, at any time, it occurs by the use of newer, more innovational production techniques, new innovational factory reorganization, or an innovational marketing strategy, to affect the supply curve of the same factory, if it is a duplication of a product at the end of its product cycle in the same area, saturated by other suppliers.[37] There is little

to profit from the innovation residual there.

The replacement of old parts, with the same identical parts, made in the same way and same costs would certainly constitute no innovation. Nevertheless, new parts made of better material would last longer (i.e., use of steel for iron) made much cheaper would entail inventions and innovations. Often, the number of patents issued and copyrights registered measure the effect of creative and inventive efforts. However, patents on new inventions measure innovations.

This is a thematic reoccurrence of event and actualities. These will sharpen resolve about areas needing distinct developments and future investment. These areas are further points of focus in the econometrics section of this dissertation. Why do certain areas cultivate and conglomerate most of the pillar of innovation formulation? Why do historically, certain cultures, elements of new societies, immigrant groups in a new country, outperform or maintain their positive contributions, even with small and constant blocks and obstacles by counterproductive abstractionists?

Economies that cultivate more positive attributes and green houses of innovation will postpone decay and instabilities that have proven ruinous to older cultures in human history.

The advanced economies require continuous improvements and educational remainders to avoid such chronic decay in their futures. Western economies have allowed beg-thy-neighbor policies to institute or advance downturn in major depression or down cycles in their regional economies. This ignores major economic realities of modernity. The Internet has advanced global connectivity and the immediacy of access to unanalyzed

information as factual or knowledge. This also inflects the danger of little knowledge in hands of the (sometime deliberately) ill informed. This aspect of technological innovation supplies xenophobes and bigots and sociopaths with communication and organizational skills they lacked in the old days. These are even more reasons to stay ahead of educational and development phases, and not to detract from them. The postwar two time-out strategies are not confronted with technologically expedited aftereffects. Seemingly, minor developmental multimillion-dollar problems become an internationally compounded fiasco, with multibillion-dollar sticker shock. Economically constrained nations will increasingly find fork-in-the-road dilemmas, which they wished they did not cause, or foresaw earlier.

International trade has advanced global economical connectivity. Induced economic failures and implosions of nations become mutual global disasters. This is another example of negative externality of technological advancements, not fully comprehended. The last two issues combined, will dominantly pre occupy most the civilization in this millenniums.

Table 6 shows the highest growth rate has taken place in foreign corporations, while the rate of growth of individual patents has decayed. The combined efforts of the United States cooperation, individuals, and government had far exceeded the patents by foreign cooperation in 1960-65 data. That is not the case later on. The growth rate of the copyrights awarded has remained constant and positive. However, the rate of growth of cooperation, individuals, and government patents has fallen behind the growth rate of the patents development by foreign cooperation.

Table 6. Annual growth rate of patents by categories and copyrights registered.

Periods	Total Patents	Foreign Corp.	U.S. Corp.	Individuals	U.S. Gov.	Registered Copyrights
60-65	6.6	14.7	6.7	4.6	4.7	4.1
65-70	0.4	10.4	- 0.14	-3.2	2.6	1.5
70-75	2.6	9.8	-1.2	5.6	1.8	5.4
75-80	- 2.8	- 0.1	- 2.9	- 4.5	-9.4	3.1
80-85	3.3	9.0	1.3	-0.06	2.0	3.2
85-87	7.9	12.3	3.9	9.3	- 4.5	3.9

Note: Column 3 includes patents to foreign governments. Data includes patents for designs, botanical plants, and reissues.
Source: U. S. Bureau of the Census, *Statistical Abstract of the United States*, Washington, D.C.: 1974, 1985, 1989.

New legal entities representing the entrepreneurs do engage in innovative ventures. The legal entities are sole ownership, S-corporations, C-corporations, or trusts, conduct all business activities. Alas, they would normally engage in innovative actions if they plan to set up new factories, build new equipment, or design new organizational relations and marketing strategies. The innovative older firms have maintained an inner innovational team.[38] They systematically engage in economic competition, through innovational process.

The distinction exists in Schumpeter between competitive capitalism and larger "trust" (institutionalized, multinational) capitalism, when sizes of the firms are in question. There is a good chance that the "giant" firms (i.e., monopolists, meganational cooperation) could engage in noneconomic means (legal, multimedia manipulations, etc.) to stop entry or shut out innovative smaller firms to certain markets. They will have to compete with other big firms their own size by more innovation and by economic means. At least, they might, due to fear of retaliation, or extensible regulatory involvement.

It is important to repeat the logical parallels between monopolies and state or national elitism enterprises. Monopolies routinely are created, for return to scale purposes often by regulation, for bribes, for misplaced and lethal forms of patriotisms, for enfant industrial protectionism, for phantom innovational creation, and for protections. Combined with oligopolies, they will further separate large-scale enterprises from the market signals and their consumers' signals. The implosion of global investment, insurance, banking, and commerce of this millennium has spared no nation. State elitism political systems can also separate the government institutions from consumers' petitions,

requests, needs, and their wrath. The culminations of misreading and protective misdirection imploded one of the three most powerful nuclear powers of the last millennium in the 1980s. The nonmarket means as the only sources of response-signals are profoundly self-terminating in any games that will put any entities in direct competition for global resources or talents. Figure 1 shows diffusion of technologies under different circumstances over time. The top half shows related elasticity of supply curves.

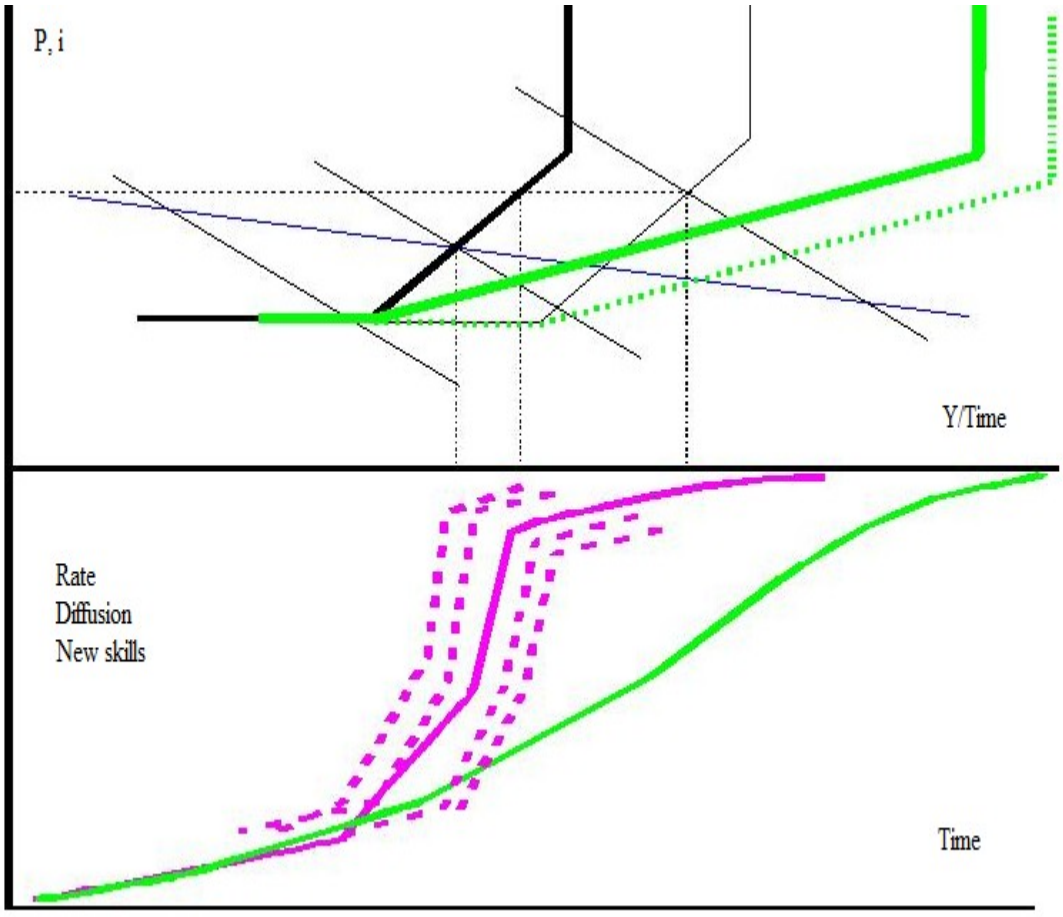

Figure 1. Speed of technological diffusion and technology supply elasticity.

There are three examples of speed of diffusions over time. The first example is the linen paper invention. The second example is the book duplications from hand to press prints. The third example is the modern day DVD distributions or digital book printing. Linen paper innovation and production was in central China (from 100 to 600 DC). North West Persia by 751 DC produced linen paper, and the invention traveled to South East Persia in 780 DC.[39] It was in Baghdad, Iraq by 793 DC. The linen paper innovation was in Egypt by 900 DC. The other dated path of travel route of linen–paper innovation is from Africa to central Europe. It continues from Morocco in 1100 DC, to Spain in 1150, to Herault France in 1150 DC, Montefano Italy in 1276, Cologne Germany in 1320, and Nuremberg 1391 in DC.[40] Book handprint duplications traveled from Persia by Monks to central Europe from 9 to 12 DC. The press prints with print press books were invented in central Europe (Cologne, and Dutch) in 1450 DC. Presently, digital books go around the globe instantaneously. Hollywood DVD productions travel in three to six months.

The workers forged the unionization of labor movement regionally to introduce negotiation-leverage in wage-package settlements to counter negative cycle generating income-concentrations and chronic demand-deflationary cycles. In addition, they introduced a human element in a machinery of production process. It is when these balancing mechanisms fail to accommodate a sustainable aggregate demand in the macro economy that the downturns in the economies become horrendously negative. Here, the true values of economists, whom are knowledgeable about other monetary and Keynesian tools, are recognized. The U.S.A. anti-trust laws are frequently cited in such cases.[41]

Others, big or small, will naturally die out if they do not adjust by constant innovations to the changing economy conditions; in that case, they fall prey to the subcase condition of "Schumpeterian creative destruction."

The Entrepreneurship

The economic agent entrepreneurs discover new economic possibilities where none existed before; they perform economic insightful acts in the dynamic cumulative innovational synthesis process. Classical economists did not recognize the role of entrepreneurs; profit was the capitalist's share only. J. B. Say knew it. It emerged after the marginalists' revolution again. In addition, the neo-classical economists noted entrepreneurs' role and profit in the 1980s. Nevertheless, they disappeared from the earlier theoretical work.

The theoretical work of J. A. Schumpeter and F. Knight reintroduced the subject to economics again.[42] The entrepreneurs with the injection of innovation and production methodologies will change the consumer satisfaction obtained [in demand terms], and the yield derived [in supply terms], from resources, mutatis mutandis in any given period.[43] They behave in a manner specifically different from other economic agents, because they will break through the traditional modus operandi, the conventional ways of thinking. They are involved in all innovational economic activities.

The entrepreneurs' skills make them uniquely aware of the relative economic possibilities around them, either for a short period or they may choose to keep informed of such relative economic conditions, laws, and social phenomenon relative to their economic activities, such as specialists in each field would learn to do. The

entrepreneurs' decision set resembles his awareness of the economic and non-economic conditions around him. There are shortened versions of entrepreneurial characteristics, as capital < financial> market arbitragers, incorrectly define both agents of capital formation process.

However, we will see the processes involving the transformation of choice ideas to applicable technologies, and successful production processes and related economic ventures are far too complex for individuals, unaided and nonsynchronized, to conduct without trial and errors, in ways that would also balance with the economics of national or integrated global economy. The 1920s, 1930s cyclical deflationary implosions in the West, 1980s military-costs implosion in the East, and repeated financial meltdowns on cyclical bases are not assuring testimonials of our academic perfect understandings, or appropriateness of our technologies transferred.

Dynamic Planning and Product Development

In utilizing new technologies, a transformative application of product life cycle, planning, and budgeting yielded to the dynamic and sustainable development of new products, utilizing new and appropriate technologies.[44]

In this model, sales of at least two products (a, b) are used as an example of two levels of technologies reflected in methodologies producing (a, b) over time. The phases of are divided into different stages to make the process a manageable series of events.[45] There are certain variables and characteristics to look for in each phase:

- Phase 1: initial development of product phase. The sales of product increases at different rate, initially at increasing rate enough to encourage the added costs of

research and development, advertising, high labor, and overhead expenses.

- Phase 2: growing of new product sales and production. While the sales will be much more than in the initial phase, the point of inflection in this phase goes from increasing of sales at increasing rate to increasing sales at decreasing rate. The capital market can finance production expansion. The research and development focuses on production technologies issues. However, the funding becomes available to study product differentiation and new product development. If that is not accomplished at this stage, it will become essential in the next phase. The process generates jobs.
- Phase 3: Product maturing phase. Some shops or small businesses stay in this phase, they also pass it on as inheritance, unless or until they completely shut down the operation. In larger operations, this becomes the take-off phase of a new firm. They present it for public shares and apply the generated access cash flow to launch product differentiations and new lines of products as they expand. The phase starts when the sales revenues are growing but at the decreasing rate. Still, the sales are higher than before, but the second mathematical differentiation starts being negative. The employment rank increased, and salaries and skill improve as well.
- Phase 4: shut off or expansion decision phase. This moment comes to all operations. For the managerial team or owners of a firm, the profitability of operation and the need to cut losses or make a graceful exit are ongoing concerns, but the sales of product start decreasing after zero growth for a time,

and they start to decrease at an increasing rate. The options in new markets or technological changes are few or unsuitable for conditions faced by the operation related to product (a). Nevertheless, the hope and options related technologies and product (b) are either expanding or also declining. Therefore, the sum of net revenues generated are increasing or changing directions. If net revenues from both operations take a negative turn, the shut-off plans will be implemented. The mop-up operations after the shut-off phase are orderly closing down and termination.

- Phase 5: the follow-up phase. In revisiting phase 1, a successful product (b) will require the same actions but perhaps with most new technologies, retooling and retraining for new skills. Larger institutions do create such flow of inventions and activities, and they can raise the needed cash flow from the capital market to enact their plans. The research and development internal to the businesses usually yields such great returns.

The net earning potential line can also represent profit from the two endeavors (a, b); however, the operational and related expenses taken out can differ in different firms.

There are some very peculiar notions about implications of excessive wage packages. The propaganda states, they are good to stay low at the lower ends, and limitless at the top end, as long as the public fund supports the top. Both notions are dangerous; they destabilize by imbalances. The former will starve the economy through diminished aggregate demand. The latter loots the capital markets and shareholders returns, and

interrupts capital formation process from the supply side. By far, the latter can prove to be far more destructive and receives the least political verbiage. The aggregate effect is no less than the political corruptions noted in the third world.

Figure 2 shows dynamic and sustainable product development phases using technologies (a, and b) for production of item a, and item b. Numbers identify phase 1 to 4 for production of a, and Phases 1 to 3 for production of item b. Starting with the third phase, operation of business using technology, the business starts with technology b. Thus, this is a shared phase of both technologies. Phases 4 and 5 are share operations, with technologies (a) and (b) at work. This can continue, if both businesses are profitable for some time.

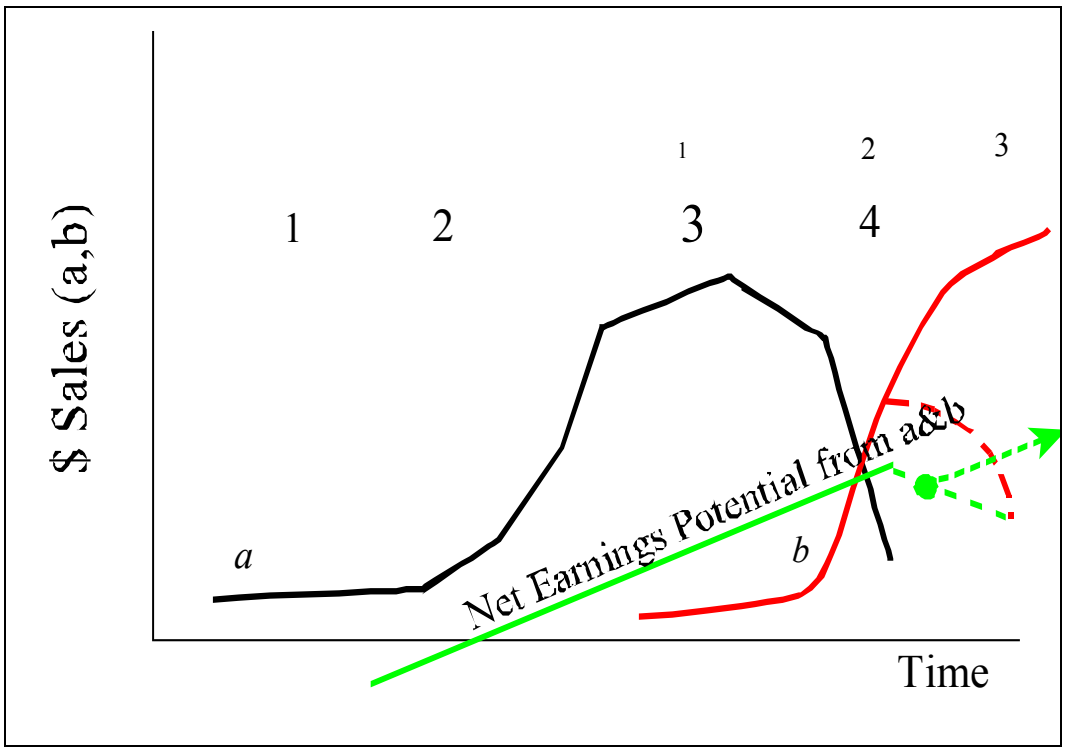

Figure 2. Dynamic and sustainable products development, technologies (a, and b).

There can be expansion and further employment of resources and newer technologies as the scope expands and profits and earnings continues. There is also a decision time to shut one or both operations and close shop. Because the market signals, the consumer demand, earning, and profits dry up.

Earnings, Net Revenues, Profits, Capital Formation

Unless there are earnings, most managers terminate or shelve the operation. Even when there are earnings, it must be sufficient to cover reasonable operational expenses, wages, rents, purchases of overheads, and machinery to justify prolonging the operation until the sales really take off. At some point, the sales and earnings increase the cash flow sufficient to have funds left over from the operational expenses and taxes that is often profit.

In most small business, this finances expanding of the operation by purchase of more equipment or capital stocks. In larger operations, higher earnings often pass on to shareholders as capital gain or equity yields. The existence of earning and the degree of risk stock holders assign to each stock determines the price earnings ratios: (7, 17, 27, and 47). At price 47 times earnings, the stockholders must be willing to hold on to a stock. The earning divided among the number of stocks determines the initial value of the stocks. At this phase, often-large set aside funds out of earnings goes for research and development, new products, and new markets, and purchase of new capital stocks, embodying the new technologies, or replacing older technologies. Executive pay packages and unreasonable benefits loot the earnings. It is reasonable to argue for the following formula for a limited number of executives. However, larger obscene sums are now

common, and growing in millions and billions of dollars. The following formula introduces an anchor-link, a sane connection between the now runaway executive pays and the real value of their economic contributions.

It will be impossible at this stage not to do this without government's further involvement to disconnect and reset the corrupted broken market mechanism, which the corporate executives and their handpicked cohorts have broken. The logical hypothesis proposes that workers by their retirement funds and executives by some stock ownership share an interest in the long-term growth of the company.

Executives and support teams subverted the logical proposition for greed and no-accountabilities no-limit pays, and fraudulently transferred the liability and risk-loss to public. The harm is global and horrendous. The following formula is a start to reintroduce some accountability back into the equations for total pay package-bands.

[(Y) x $ 42,600(AV U.S. INCOMES = Base Value)]

Base Value x [(1 $\pm$ Rate of growth or decay)]

{(1+ r, $\boxed{\pm}$%20), (Y = 10, 40, 100)}

For example: (10 x $42,600= $426,000 base value)

$426, 000 base value x {1.20 or 0.80} = $511,200 or $340,800

No more than the same amounts in shares ought to be purchasable (or optioned) in the open market as part of their salary packages of any executives. No options or any speculative instruments should be in such a package. Executives on their own can buy or sell options in the open market. Unless the options are in their own company, the move has to be pre-announced by six months; up to six years after they leave the company (about

two short-term business cycles), they ought not to liquidate their holdings, unless there is a pre-arranged semiannual plan to sell, or convert their stocks openly.

The much larger numbers in multimillions are reflective of the deterioration of democracy and market imperfections now long established. They go back to Nixon-ism's effect on political ethics beyond Nixon, dependencies of the same political structures and educational institutions on business funds for campaign advertisements for legal favors. An example is the abolishment of the Glass-Steagal act without protective-clauses for regular customers, small investors, and voters. The depression era law made it illegal for banks (and financial institutions) to fund investing, and marketing of stocks for the same entities they loaned to out of their customers' holdings. This also did not allow the accounting firms to consult the same entity they audit.

The Glass-Steagal act established legal firewalls between activities that aid greed-induced criminal activities, because a nasty history of criminal activities undermined the capital markets and capital formations for the duration of the US depression. In modern times, Enronism, and Madoffism are current. In this millennium, the global liquidity and the economic down turn are again historic in the size and their consequences. When the banking, investing, and auditing interest groups approached the representatives, they had a captured audience. The law modifications led to the most regulatory-mechanisms for protections of public welfare and economic protections to fail in major ways.[46] Campaign funding reform acts are other golden sources of analysis of gradual deterioration of ethics and morals of politics and commerce, and sustainable damages to any democracy by way of imploding commerce.

Most fast law-patches in the recent past have been under-whelming to long suffering (2002) stock markets; such fast laws have been superficial and further eroding to capital formation and capital market. Until the population responds quickly to these issues, cosmetic publicity stunts are delaying proper repairs to market trust. Some urban centers have advanced living wage laws to maintain not only families with at least one full time worker, but also their own urban economies.

An important function of government is to accommodate small businesses in creating new jobs, and help the job creation engine of the national economy by tax credits or tools. The government can allow for a national living wage law in place of the minimum wage laws, with a special clause to permit three-months to six-months training period, at up to 80 percent of living wage law. Special attention must focus on the practice of mass firing and rehiring to keep wages low and abuse of temporary workers for the same propose, and special taxes on extreme executive multimillions salaries instead of overt salary caps.

There are growing portions of the population, working poor and legal immigrants among them, pay taxes and get absolutely no representation. The federal, state, and local voting rights ought to include long-term permanent residents to engage the disengaged aloof (elitists') systems. The antiterrorism laws – if we trust their proponents– are sufficient to protect the nation from all harmful or criminal intents, if it is not internal criminal mischief. It is harmful to the process of capital formation to comfort the pathological xenophobes and chronic hate-groups, who scream and rage against legal and constitutional rights granted legal resident and citizens in the United States, while they

wish for denial of women voting rights, regressions to slavery acts, denial of any local vote rights for taxpaying immigrants, and they make up anticonstitutional pretexts to deport them without any media, a real court, or judges' scrutiny, especially at time of war or other national insecurities.

Hiding behind political labels cannot justify inaction on fundamental issues of work and lives of the population. Especially alarming is the silence of those in leadership positions. They scream about minor increases of dimes and nickels in minimum wages for working poor and growing hordes of the uninsured workers, but are dismissive of the obscene multibillion-dollar executives wage packages and their even more lucrative retirement severance agreements. These are looting and divesting the capital formation markets, shareholders' equities, and workers retirements and sustaining damage to the future wealth of the nation. They are damaging the process of national wealth building. They harm the supply and demand sustainability balances of the national and global macroeconomics. The socialization of capitalists' bad risks and losses, and privatization of monopolists' profits concentrated is a self-destructing, implosive old model, which will not leave us voluntarily. It is neither socialism nor capitalism; it is not acceptable to liberals, nor libertarians, or conservatives. It is a financial fraud, bribing the political systems for its temporary survival globally, before it is forced off the financial stage.

Notes

[1] Kennedy & Thirlwall, 12

[2] Edwin Mansfield, *Technological Change* (New York: W. W. Norton & Co. 1971), 9

[3] Vernon W. Ruttan, "Usher and Schumpeter on Invention, Innovation, and Technological Change," *Quarterly Journal of Economics*, 73 (1960): 596-606.

[4] Mansfield, 10

[5] Mansfield, 11

[6] Ibid. 17

[7] Michael Moran, "New England Transcendentalism," in *The Encyclopedia of Philosophy* (New York: Macmillan Publishing Co., Vols. 5 and 6, 1967), 479-480

[8] First amendments of USA constitution, and importance of grants, academic tenures, and industrial apprenticeships, are technological solutions applied already.

[9] Abbot Payson Usher, *A History of Mechanical Inventions*, Revised edition. (London: Oxford University Press, 1954), 60

[10] Ibid. 6, Chicago sociologists W. F. Ogburn and S. C. Gilfillan explained the mechanistic process.

[11] S. C. Gilfillan wrote that the invention would take place because of need and the process or individual may not be necessary. Ruttan, 601

[12] Ibid. 61

[13] T. R. Miles, "Gestalt Theory," in *The Encyclopedia of Philosophy* (New York: Macmillan Publishing Co., Vols. 3 and 4, 1967), 318-323

[14] Ibid.

[15] Usher, 61-64

[16] T. R. Miles, 318

[17] Ibid, 318-323

[18] V. W. Ruttan, 604.

Colin G. Thirtle and V. W Ruttan, *The Role of Demand and Supply in the Generation and Diffusion of Technological Change (*Switzerland: Harwood Academic Publishers, 1987), 5

[19] Mansfield, 48

[20] Colin G. Thirtle and V. W. Ruttan, 9

[21] V. W. Ruttan, 602

[22] In 1900, 80 percent of the U. S. patented inventions were issued to individuals. By 1957, the individuals' shares were 40 percent of patents issued. Mansfield, 65.

[23] Ibid, 40-41. "Thomas Edison is credited for the first research lab (1876) in the United States. Some others credit Eastman Kodak (1893), B.F. Goodrich (1895) and General Electric (1900) applied the industrial laboratory idea as a new process for inventions."

[24] Ibid, 76-77 "Frank Lynn's study introduced the average time interval of incubation period from (1885-1919) 30 years and (1920-1944) 16 years to (1945-1964) 9 years. The rate of innovational process was the same, or the commercial development for the same data was 7, 8, and 5 years."

[25] By entitlements, the assumption implies the older age entitlements. Yet, two growing sources of dependence are military industrial complex and incarceration industries. AT rate of $45,000 per humane-incarceration per year, versus $6000-$12000 per pupil at (15-25) students per class, it is our finance, which will fail, faster than our schools. Thus, the constant raising of age for social security needs to be balance with unification of multiple dipping into one social security and mean testing, first. We will need to educate many with good jobs to finance the rest of this broken business model, and fix the broken legal immigration system faster.

[26] U.S. President, *Economic Report of the President* (Washington, D.C.: Government printing office, 1990), 112

[27] Ronald Takaki, *A Different Mirror: A History of Multicultural America* (London: Little, Brown and Company, 1993), 65-67

[28] Part of Japan's push for more basic research is to quadruple their engineers and scientists from the current graduation rates of 2 scientists, 9 engineers for every 100,000. The British are at 10, 7; and the graduation rate is 9 and 12 per 100,000 Americans. N. Valery, "Survey of Japanese Technology," *The Economist*, Dec. 2, 1989. 7.

[29] Ben Dolven, "Physicks," (Tokyo, November 14, 2002) http://www.feer.com/cgi-bin/prog.

[30] U.S. President, *Economic Report of the President* (Washington, D.C.: Government printing office, 1990), 112-113

[31] Ibid, 114

[32] Source for population data was the International Financial Statistics, 1983. Currency was constant 1971 U.S. dollars. Theodore W. Schultz, *Investing in People* (Berkeley: University of California Press, 1981), 50-51
R. E. Boyce Evenson, *Agricultural Research and Extension Programs* (New York: Agricultural Development Council, 1975), Appendix II.

[33] Usher, 68-69

[34] V. W. Ruttan, 604

[35] J. A. Schumpeter, *Business Cycles: A Theoretical, Historical, and Statistical Analysis of the Capitalist Process*, Vol. I (New York: McGraw Hill Book Co., Inc., 1939), 87-97

[36] In the following article, Usher's developments and Schumpeter's theory of innovation are combined. Alternatively, an explicit link between invention and innovation are made. Carolyn Shaw Solo, "Innovation in the Capitalist Process: A Critique of the Schumpeterian Theory," *Quarterly Journal of Economics*, 1951: 422.

[37] Two examples are the retailers' multitudes of stores, used as temporary occupation, and European artisans' businesses, where age and tradition dictate business formation. Schumpeter, 87-97

[38] Solo stated "It is, therefore, not the new firms innovate and the old firms react, but all the competing firms innovate, some succeeding, others failing." in, "Innovation in the Capitalist Process: A Critique of the Schumpeterian Theory". *Q.E.J.*, 1951: 425

[39] Clay tablet duplications, reprints, use of numbers, zero, accounting date to pre 600 BC.

[40] Usher, 238-247

[41] Ibid, 96

[42] M. I. Kirzner, *Discovery and the Capitalist Process* (Chicago: The University of Chicago Press, 1985), 1-14.

[43] Peter F. Drucker, *Innovation and Entrepreneurship* (New York: Harper & Row Publishers, 1985), 33.

[44] Lloyd L. Byers, "Concepts of Strategic Management: Planning and Implementation"(New York, Harper & Row Publishers, 1984), 194

[45] R. S. Savich and L.A. Thomson, "Resource Allocation within The Product life Cycles," *MSU Business Topic* (fall, 1978): 38

[46] M. Gordo, "Watchdog System Failed Enron", AP Business Writer, Mon Oct 7, 1:58 AM ET Senate report: http://www.senate.gov/gov_affairs/100702watchdogsreport.pdf. Internet sources are subject to frequent modifications at their source.

CHAPTER 4

NEW CAPITAL

This economically significant word, capital has evolved with empirical use and economic theory, over time. It is difficult to imagine any economists that have not struggled with this most explained term. Webster defines capital as:

> "Stocks of accumulated goods, value of them; accumulated goods used in production of other goods, accumulated possessions to bring in income."[1]

The retrospection on the word capital goes back to Greek usage of a practice long in use. In Persia, India, China, and Egypt, the original urban and trade systems used the practice to ease commerce. The Greek usage of the word-defined capital referred to the principal sum of money or quantity of goods (grain, wine, stocks) loaned. Like the Greek word for head, [caput], was the Latin noun from the adjective word, [capital], used to describe the amount of the loan, [capitalis pars debiti].[2]

The practice was common among the practitioners and "Bazaar" people, and caravan masters, a close-band of adventurers and risk takers, even before risk taking was defined. However, this was focused risk taking for substantial material gain. It was different from the cave developer risking life to venture walking out of caves for food. This kind of time-risk factor had a potential greater material gain as an added dimension. It was different from the types of risk generic sailors, travelers, and caravan travelers' took. It was not risk for adventure's sake. In addition, the origins of this type of risk go as far

back as humanoids venturing in early primal migration for better food or richer plateaus. Tribes passed from Africa to Persia and beyond as ice caps receded, for better pastures, fruits, nuts, berries, and hunting grounds, had better pay-offs. They had better chances for rewards versus risk, survivals versus death and starvation. They established the original area and sources of human development settlements, a time span that started before two millions years ago at the plate tectonic movement epoch back to 50,000 years ago at the cave-settlements age.

Mercantilism defined the notion of wealth as centered in accumulation of gold and silver, and self-centric opportunistic plundering rather than trade. It is a strategy used by England to bypass Holland commerce around 1775 to1870. As Adam Smith noted, the British navigation acts affected Dutch sea power, alas, causing problems for the inevitable idea of "Free Trade." When the notion of free global trade found its merits beneficial, the benefactors and the receivers of the notion still are not so certain of the mutuality of the benefits, considering the source.

The physiocratic system in the person of M. Quesnay, a physician in the "tableau économique," introduced related wealth (away from the gold and silver version) to production (as in agricultural productivity) circulating hand to hand (with elements of laissez faire) like the flow of blood in the human body.[3] However, they only looked at agricultural activities as reasonable commerce; trade and the manufacturing industry were not acceptable economic activities. The early gathering of forces and intellectual debris of the technological march towards the industrial revolution overran them. The manufactured concept of capital was culturally equivocated, and identified initially as the unsavory

practices of usury on consumptive loans in barter economies. It morphed into the capital as the principle sum loaned to merchants, this gained more acceptances.[4] They used it in commerce or trade, yielded a stream of revenue, income, and rent. Besides, it employed people and generated wages, and income. These people could afford to buy more of the products. They were happier and they did not revolt, or hang their governors. These basic attributes of concepts of capital and interest kept them alive among the practitioners, political leaders, and political economists and philosophers of the time, until other technologies evolved.

Adam Smith was a contemporary and acquaintance of the modified Quesnay and Turgot definitions of capital. Adam Smith identified fixed capital, the kind of capital that generates revenue of profit without "circulating or changing masters."[5] He classified some accumulated goods for consumption, and other accumulated goods, those that yield a flow of income. The investor buys the former for resale for a profit, thus, it is a circulating capital good. She buys the later to keep for the flow of revenue (income) it will generate periodically, less the cost of its upkeep. He stated that societal arrangements reflected those of the individual making it up.

Adam Smith divided individual and societal possessions for immediate consumptive goods and longer-term concerns, especially if individuals have a small amount of these positions to maintain themselves for a short period, like seasonally for a few months to a year. In the longer-term periods, beyond the point of immediate self-satisfactory consumption, the concerns turned to generating revenue. The revenue generation occurred by two types of capital. One is capital as means of acquisition of

revenue (interest). Two, is capital as means of further production. The fixed capital does not change hands, or change form during the production process. Moreover, fixed capital does not go from one producer to another as inventory, like planting seeds, or wheat from farmers to bread makers. The investor cannot alter it into consumable goods: machinery, factories, and business buildings, modified and improved land. Adam Smith listed the societal learnt skills and "useful skill," as example of fixed capital. The circular capital is the kind of capital that changes hand and form, from one producer to another.[6] All fixed capitals originate from circular capital, and is maintained and repaired using circular capital[7]. Examples of circular capitals are money and inventories of incomplete goods (parts of cloth, furniture, made in one workshop), or completed products in the hands of merchants to be sold (as wholesalers' or retailers' inventories), or a woven and painted cloth sold to a tailor.

The intellectual boiling pot of Western Europe from 1300-1700 had certain names in common. Some of the notable American names also appear on the constitution of United States. Benjamin Franklin was closely associated with Adam Smith, Quesnay, and Turgot. However, the economic experiences of the United States took place in a truncated form and in a much shorter time. There a few factors that helped the United States with the head start on their growth of development. Some of these factors were less exogenous conflicts and unlimited land (from the economically uninformed inhabitants <and under-armed indigenous population>, including all nations of American Indians). The extremely motivated populations, the new settlers (immigrants) without direct controls and constraints of their previous brutal governments and civic laws already imposed

elsewhere and in Europe went all out in resource maximizations (exploitations). The enslavement of other workers without appropriate moral constraints, or proper economical wages, or market constrained as slave labors are well documented. They had access to the international supply of available rudimentary tools, and knowledge, in terms of embodied capital with immigrants (with modified legal or voting rights) other than slaves, and indigenous people of Americas' skill in survival on natural resources. Immigrants were equally motivated and grateful but unconstraint with dictatorship or litigious brutalities beyond the water, they helped to unleash an economic powerhouse, which also did turn on them.

That is not to say bad ideas did not or do not travel over the water; alas, the constitutional rights and markets tend to overcome office feudalists over the long run, and clean elections are institutionalized periodical bloodless revolutions. While the independence revolution, or north and south civil war, and emancipation revolution were not bloodless, and labor problems also took place, bloodless revolutions occurred in less dishonest elections. So honest democratic elections remain a lot more amicable, and less destructive; never the less, they are a technological advancement when they truly take shape and they are nurtured to remain in full force.

Early American economists Simmon Newcomb, John Rae, John Bates Clark, and Irvin Fisher's theoretical innovations modified and added uniquely to the capital and interest theory. The special contribution of technological progress played a prominent factor in these unique American phenomena. America spent less time (less than 200 years) relative to England or Europe, starting at about the same level of progress to obtain the

economic and industrial leadership of modern time.

Simmon Newcomb (1835-1909), a mathematician, formulated an equation of exchange in monetary theory, later useful to I. Fisher's work. He also expounded the ideas of Cantillon and Quesnay's circular flow as "societary circulation," demonstrating the flow of money and goods, and from the opposite direction, the flow of services.[8] He also reintroduced the ideas of "flow" and "funds" as income and capital.

John Rae (1796-1872) was a Scottish economist who resided in Canada. He wrote in "The Sociological Theory of Capital" under headings of personal finance, about the Roman Empire's fall and decay. The mass indulgences and present self-consumptions squandered and used up all of the wealth and future of the empire.

John Rae's work on capital goods "instruments" stated the common factors among the capital goods:

- They are a byproduct of labor.
- They have a "capacity" to produce "events" that satisfy human wants.
- They are "exhausted."

He further wrote of formation, selection, and prioritization among different capital goods. J. Rae applied three criteria to prioritize capital goods:

- By higher yield, or return.
- Lower costs.
- By the shorter time between formation and exhaustion.

The first and second criteria are also in Fisher's Model, if Marshal's net return is used. There are some issues with the last criteria, that is, if the longer time-use of a capital good

and increased demand increases the net return of capital good over time relative to the shorter time-use instrument.

Perhaps an example can point out the error better. That is, a steel plow, an iron plow, and a wooden plow can last for a long time, in the same order listed. Their usefulness also reflects the same order. Therefore, the revenue-life associated with the steel plow will reflect the longer useful life of the steel plow. Naturally, that far exceed the revenue-life of a wooden plow stick, which has a shorter useful life than steel plow; thus, the contradiction.

The focus of the work was on causes of national wealth.

The four causes are:

- Natural resources.
- The desire to accumulate.
- Wage rate holds constant as in "existing circumstances."
- The inventive faculty.

He measured capital goods by the workers accumulation in capital goods. He also identified the amount of workers that each capital good would replace, but holding wage constant. First, the objection was that "to compute the capacity of goods," the concern should be with wages and not "mental and physical exertions" of workers.[9] Only the first part of this makes sense. The replacement of workers by capital goods will make the supply of workers increase; therefore, wages fluctuate, but in the short run wages mainly decline. This also affects the rate of capital goods formation, a fact hidden from the modern day supply-side polemicists.

The Rate of New Capital Formation

The new capital stocks and duplication of old capital stocks, in a dynamic economy can be produced at different rates of growth.[10] These varied rates of growth of capital stocks can serve as one of the main inputs, can enhance, and sustain economic growth over time.[11] That is, capital flow funds will be converted to capital stock over time. This is defined here as the rate of new capital formation. However, the return to all capital forms, the net income flow over time, or capital value divided by the initial investment can prioritize all capital-stock forms in the market place. Some of these returns can be much higher than the market interest rates in modern economies. That is, the rates supply and demand for money meet in the short or longer run is a bare minimum; most financial money managers would want to be earning more than that rate, in normal nonrecessionary and competitive economies.

Economies riddled by noncompetitive markets or political and exchange risks pay even more for the higher capital return requirements to attract investors. Thus, the would-be capitalists, they need to meet many challenges and risks and be forward looking in their prospectus, at all times, whether they are in the market or not. Such delusions multiply by states picking up banners of superpowers and other nonsensical aversion of logic, and engage in technologically enhanced destruction of all forms of capital stocks, beyond the consensual defensive need and stopping of genocidal maniacs. Such wars only lead to bankruptcy of treasuries, and eventually self-destruction, and destructions of many capital stocks in the process, which nations can ill afford it as their populations explode exponentially. Every time we globally raise a finger to destroy or

defraud, we are harming ourselves and scare off more would-be capitalists, investors: ourselves.

The technologies of market integration, globalization, and instantaneous multimedia mass communications have progressed along these lines all beyond the undoing phase (shut-off points), so we all need to learn how to live with the consequences of open and exposed multicultural syndromes.

Alas, would-be capitalists, all of us, need to study the rate of return of the capital stocks, rent on capital stocks, the internal rate of return of investment projects, also the rate of changes in related prices, and the interest rate on loan or funds needed in the market. When all the dust settles and the sand falls motionless in its golden waves, the individuals build up the globe.

In a dynamic economy, any number of variables affect these rates, and combined with expectations, they can make these rate changes differ from one another. In a dynamic economy, even simple issues like project duration and rate of obsolescence due to technological innovation, or amount of capital consumption, or capital replacement funds can add to the risks-list and make it more logical to set a much higher rate of return of capital stock, much more then the market interest rates to attract investors.

It is astonishing, this seemingly simple economic proposition, which is lost on the most of the self-proclaimed political geniuses of our time. Moreover, how much public fund (tax revenues) are spent to remedy none diplomatic or inhumane verbosities, and correcting for inappropriate laws? Most of the tax saving can easily go to benefit capital formation.

There is also lists of risks that affect decisions. A list of these risks follows:

- Market risks.
- Business cycle risks.
- Currency exchange risks.
- Fundamental or more permanent taste change risks.
- Regulation change risks.
- Political change risks.
- Climatic or natural disaster risks.
- War and regional-conflict risks.

A persons' decision or a group's decisions (individually, or in partnership and corporations) to purchase should be after considerable calculations about expected revenue (expected flow of income over time) from such capital stocks less other costs of investment. John M. Keynes included assets purchased at stock market, and "fixed capital, working capital or liquid capital."[12] Keynes definition of aggregate investment as equal to net investment is "the net addition to all kinds of capital equipment."[13] Besides calculating the rate of return of capital stocks, investors must compare these rates of returns with the market interest rate, government bonds, or other relatively safer liquid assets.

Investors can expect a much higher rate of return (r), when opportunity costs and risk costs are greater than the interest rate (i). The expected revenue (ER) includes the costs of operation (OC) plus a premium for risk (RP), deducted from the estimation of future revenues (FR).[14] Thus, assets costs (AC) calculation is by following

formula. This equation is the asset costs:

$$AC \approx \frac{FR_n - (OC + RP)}{(1+R)^n}$$

IFF: RP ≈ 0, for n= 1, 2, 3 …

The comparison is between the present values of invested funds versus the market value of capital stock purchased at its market price. The next equation is the market price of capital stock:

$$PV \approx \frac{R_n}{(1+i)^n}$$

Then if:

$$AC \geq PV$$

That is a buy signal. However, when (RP>0) conditions become more complex. This equation is Lemma 1, for capital stock purchase.

$$\frac{AC}{PV} \geq \vartheta$$

For

$$\frac{r}{i} \geq \theta$$

Then the constants are:

$\vartheta, \theta > 1$ for RP > 0

In presence of higher risk, the purchaser of capital stocks or investor still needs to determine at point of difference between r and i they like to make their capital purchases.[15]

Proportionally, the rate of return of risky ventures and longer-term projects ought to be higher than the rate of returns for safer, shorter-term projects, or safer government bonds with guarantee of return of principles. When the economic agents evaluate the priority lists of such projects, these economic agents have to limit their present consumption for higher future rewards, for higher future consumption and utility preference curves. They see a new set of options, to invest for a better future.

Capital Formation and Intratechnological Injections

In the process of purchase of new stock of capital, and process of conversion of capital flow-funds to replace old capital with new capital, appropriate technologies are introduced in the process of production.

Here we have used the arithmetic to identify between capital stock formation over time, with net investments over time, to calculate and show this expanded calculation in process of production, where the capital stocks are put to use.

The following equations show the relations between capital stock and investments:

$$\dot{K} \equiv \dot{I}$$

$$\frac{dK}{dt} \equiv \frac{dI}{dt}$$

$$\dot{K} \equiv I_n(t)$$

In these next formulations, the flows of funds are managed. The funds are

used and invested. The new capital stocks are purchase by the funds. The production process then uses them in the process supplying goods and services. That is, capital consumption fund is spent on investments net of capital consumption, and replacements**.**

These next formulations study the management of flow of funds. The fund managers invest the funds. The funds purchase new capital stock, which goes to use in the production. That is, the fund manager spends the capital consumption fund on investments net of capital consumption, and replacements.

In this process, the injection of new capital stock is the injection of technological advancement over time in the process of production. The fund managers can do this without recognition of all implications, simply to maximize profit or returns. Never the less, the injections of technologies take place.

The same way to restate it is that depreciation funds are equal to investment net of depreciation plus the replacement of new capital stocks. One other definition relationship explains that gross investment is equal to net investment less deprecation.

The following definitions and formulation introduce aspects of technological advancements in the process. Capital consumption is (CC), replacement is (R), and Investment is (I), which is adjusted net investment, gross investment. Depreciation is (D), capital stock is (K). Therefore, capital stock increases take place, when new investments are added to older capital stock. Adjusted net investment and net investment are added to older capital stock. The difference is in that adjusted net investment has portions of capital consumption and replacement are added back, as new

technologies, reinvested in the process of production.

These equations show injection of technologies by investment:

$$CC \equiv \mathrm{I}_C + R$$
$$D \equiv \mathrm{I}_D + R$$
$$\dot{\mathrm{I}}_D = \delta K - \rho K$$
$$\mathrm{I}_N \equiv \mathrm{I}_G - D$$
$$\mathrm{I}_N = \mathrm{I}_G - (\mathrm{I}_D + R)$$
$$\mathrm{I}_N + \mathrm{I}_D = \mathrm{I}_G - R$$
$$\mathrm{I}_N^A \equiv \mathrm{I}_N + \mathrm{I}_D$$
$$\mathrm{I}_G = \mathrm{I}_N^A + R$$

The rate of depreciation and the rate of replacement need to stay positive, and their differences also need to stay above zero, in order that the economic production process is assured of continuity. However, both rates need to increase over time in order to insure continuity in the production process in the economy. The next equations show lemma 2, the continuity:

$$(\delta - \rho) > 0$$
$$\delta - \rho + \rho > \rho$$
$$\therefore \delta > \rho$$

The set aside depreciation fund can change, institutions or states can further augment the depreciation fund to enhance the replacement of capital, in cases of dynamic underestimations and insufficiencies. Unless institutional arrangements to fulfill the

insufficiency and replacement of the new capital stock remain viable, the economic productive units will not stay profitable and competitive.

The journey from choices of individuals from investment picks to the selection and accumulation of all investments, into the overall economy is where injection of technology contributes to the economy handsomely and repeatedly. There are decisions made for economic reasons in what people demand. The decisions are not all made with a full comprehension of technologies (a, b, to z) that are in this item more than that item. Yet, the investors logically evaluate profitability, returns, and comparative values, by what people want more, consumers demand more, and pay more for this item versus all other items at the time.

All active members of any functional economy will contribute to form stock of new capital over time by their saving and their investments. The inflows of investments, from all active members of the economy, become stock of capital over time.

It is false to assume that workers, the middle class, their union funds, the institutions that invest their IRA (retirement funds), do not contribute to national capital formation process; therefore, tax breaks should go to the upper 5 percent of the economy. It is a harmful notion, because it underfunds the capital formation. It chronically undermined the aggregate demand formulations and formation over the longer run. That one Keynesian multiplier solution cannot balance out years of underfunding of aggregate demand. Maintenance, sustainability, and growth multipliers are needed. Figure 3 is a traditional presentation of dynamic change flow of investment into stock of capital. Under the curve shows the accumulations and injection of new capital stock (K) over time.

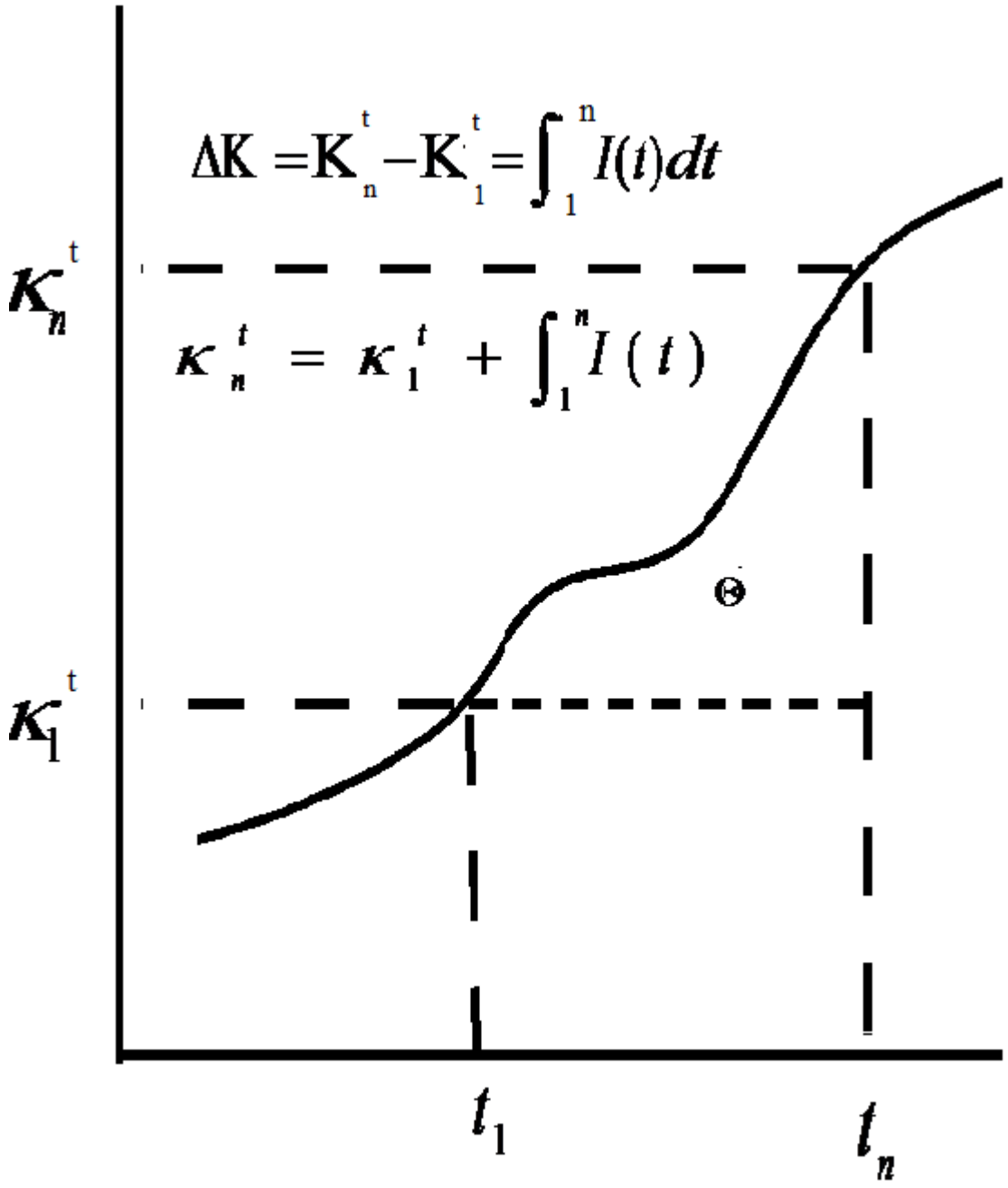

Figure 3. Dynamic capital formations by net investment and technology injections.

Capital formation is the addition of new stock of capital added to the initial capital stock. This can happen as net new investments over time. A capital fund can observe capital depreciation fund and replacement funds over time. These funds plus public and private sources of loans can pay for replacement capital.

$$\dot{\Pi} = \sum_{1}^{n} R_t (1+i)^{-t} \therefore \dot{\Pi}_k = \int_1^n F(t) e^{-it} dt$$

In the macroeconomics, dynamic technological injection occurs at this level. Henceforth, in aggregation, the perpetual flow over time is reflected in the later formulation. In addition, the individual production will require periodical flow-cash creation at or above average costs of operational equivalences to maintain competitive edges, as we explained. The next equation is Lemma3, or the sustainability lemma.

$$\dot{\Pi} = \sum_{1}^{n} R_t (1+i)^{-t} \geq AV\dot{\Pi}_k = \int_1^n F(t) e^{-it} dt$$

In the longer run, the injection of technological advancement enables the individual operations to remain in production and adapt to the free market forces as required for a sustainable operation. Moreover, these last three lemmas will insure these operational survivals. That is a dynamic strategy for sustainable investment in new technologies.

Notes

[1] Webster's Ninth Collegiate Dictionary (Massachusetts: Merriam-Webster Inc., 1985)

[2] Eugen Von Böhn_Bawerk, *Capital and Interest: Positive Theory if Capital,* Vol. II, Trans. G. D. Hunke and H. F. Sennholz, (Illinois: Libertarian Press, 1959), 16

[3] Robert L. Heilbroner, *The Worldly Philosophers*, (New York: Special Edition Time Inc., 1962), 42

[4] Eugen Von Böhn_Bawerk, 17

[5] Adam Smith, *An Inquiry into The Nature and Cause of Wealth of Nations*, Edited by E. Cannon, (Chicago: University of Chicago Press, 1st ed. 1976), 296

[6] Ibid, 299, 305

[7] The concepts of flow, as circular capital, and stock as fixed capital also are relevant here.

[8] Henry William Spiegle, *The Growth of Economic Thought*, (North Carolina: Duke University Press, 1983), 616-617

[9] Böhn_Bawerk, 211

[10] Böhn_Bawerk in developing his theory of interest made a distinction among "original" factors (land and labor) and the produced factor (capital).

[11] K. Blaug, *Economic Theory in Retrospective*, 525

[12] Keynes definition is different from the gross investment definition currently in use.

[13] John M. Keynes, *The General Theory of Employment, Interest and Money*, (London Royal Economic Society), 74-76

[14] Keynes is in agreement with Irvin Fisher's methods used (1930) in the" theory of interest"; where instead of marginal efficiency of capital, the rate of return over costs is used.

[15] Ibid, 135-140

CHAPTER 5

ADJUSTED NET INVESTMENT AND TECHNOLOGIES

The new measurements in capital stocks are further studied. The theoretical and methodic evolution and compilations reveal how they are collected as data under net and adjusted net investment from macro aggregate data. These also affect the economic studies. Especially, they affect the macro economy.

New Measurements and Adjusted Capital Stock Formation

The firm decision in purchase of new stock of capital will eventually in aggregate impact the macro-economy; the right decision at the right time about new capital stock and investments in appropriate-ungraded replacement will add up the significant aggregated impact with longer duration on the overall economic activities.

The following shows the formulation for traditional and new capital.

$$\mathrm{K} \equiv \mathrm{K} + \Delta \mathrm{K}$$
$$\mathrm{K}_2 \equiv \mathrm{K}_1 + \mathrm{I}_{1N}\,(\textit{Traditional})$$
$$\mathrm{K}_2 \equiv \mathrm{K}_1 + \mathrm{I}^{A}_{1N}\,(\textit{Adjusted})$$

Beyond the initial comparative decision about new capital stock, new technologies embodied and disembodied in the capital stock, there are opportunities along the way in repair and replacement with each new discovery and decision. Therefore, at the end of period one, capital stocks produce a certain amount of goods and services. However, the capital set aside fund for depreciations added to the repair and replacement fund will mix.

Therefore, expenditures on new parts had to convert some of the capital stock fund set-aside for new parts. The new parts entail new technologies in making them, or in material used in the new parts. Hence, from the gross investment we now have traditional net investment, or newly adjusted net investment, and the fruition of new technologies in adjusted capital stock. Thus, a new aggregate number, and a new measurement of capital stock in the economy is presented in this study.

Data and New Measurement of Capital

The use of data, even problematic data, and aggregation of economic variables are ubiquitous phenomena; even "measurement without theory" in the business cycle was assumed as an economic tool of discovery. The economic thinking was that business cycles were short run, self-correcting problems. Wesley Clair Mitchell's study (1913) was about collecting factual data. Thus, the policy implication of the theory resulted in the nonresponsive policies to business downturns, including President Hoover's policy during the economic depression[1]. He founded (1920) the National Bureau of Economic Research. He and Arthur Burn wrote (1946) "Measuring Business Cycles," leading to the idea they were measuring without theory, or aiming to write a theory about the cycles. The hypothesis in T. Koopmans's postulate (of 1946) about Burn-Mitchell's book, modified.[2] By 1961, the Department of Commerce started publishing monthly the leading, coincidental, and lagging economic indicators. This was followed by the International Economic Indicators project at the National Bureau of Economic Research by Moore and Klein (1973).[3] Hence, on occasions, the absence of conceptual understanding of the variables measured can substantially influence results.

In banking and accounting, a periodic estimation of capital assets in currency is the represented value of capital. Yet, this measure--as you noted in the section on the definition of capital--has been a point of extensive economic discussion. An important and truncated redefinition relates to this research as follows:

- The gap among physical assets used in production.
- The limited but different life span of these physical assets in production.
- The depreciation and replacement of these capital stocks.
- The heterogeneous natures of capital and the assumed homogeneous funds in aggregation.

The consolidation of arguments in juxtapositions that lead to proper actionable decisions, remain an important task of scientific inquiry. Evsey Domar examined the estimation of average life span, calculation of replacement, and depreciation. This remains an important study now. It gives us an estimated average age of capital in use. Thus, it distinguishes between short-term and long-term analysis. This also was a concern of late great economist and contemporary of J. M. Keynes, Joan Robinson.[4] Therefore, macro-economic data of national income accounts and aggregated variables can contain errors or misrepresentation to cause concerns. Another area of debate was reswitching (Mrs. Robinson of Cambridge, U.K.), with implication extended to all capital aggregation studies. Baumol (1977) wrote, "It is reasonable to build macro models for theoretical analysis and or econometric estimation using a single figure for the aggregated quantity of capital is as defensible as any other index number construct .... [reswitching] has re-emphasized the absence of historical, institutional, or sociological content... [in]

process of distribution."[5] In the following relations, some of the definitions and methods of formulation of the national account variables are represented. The following equations show the traditional macroeconomic relations.

GNP is gross national product. GI is gross national investment. G is government spending. C is national consumption. NNP is net national product; NI, net national investment; D, national depreciation; GS, gross national saving. PS is net personal saving. BS is business saving. GS is government budget surplus.

$$GNP = GI + G + C$$

$$NNP = NI + G + C;\ NI = GI - D;\ NNP = GNP - D$$

$$[GI = GS)] = NP + BS+GS$$

Gross national product is an estimated sum of all national final sales of goods and services. It is assumed as a nominal gross national product, which is gross domestic product plus exports minus imports. It is an estimation of the number in local currency of many heterogeneous products, goods, and services exchanged in the economy. The real gross national product is the above figure divided by an estimated national price number, a base year price-deflator index or CPI, a base year consumer price index. Net national product is calculated as an estimated dollar value of all products, or all earnings and costs of the nation. Real net national product is a base year constant dollar value of the same estimation. It is calculated by dividing the nominal estimation in current dollar value of net national product by a base year deflating estimation of price index. The net national product is less than the gross national product by depreciation value, calculated from product flow (demand side). Net national product, from the costs circular flow, supply

side, is the sum of indirect business taxes, corporate profits, wages and salaries, interests, rents, and incorporated business income.

Gross investment is an estimated value of all buildings, factories, and net inventories. Net investment or capital formation by traditional definition is gross investment less capital depreciation.[6] Net investment as formation of real capital asset, machines, and building structures is the focus of national accounting; thus, it is different from the personal finance notions of individual investments in stocks, bonds, retirement funds, and mutual funds. This cultivates a capital-formation income illusion, that consumers, middle class workers, do not invest their income, They spend it all, and only capitalists, the upper income people invest via their wealth effect. This notion is ignorant of the 1970-80 technological synthesis in the personal financial revolution. That is, about three trillion dollars of the middle class assets will eventually end up in real capital stocks, or financial instruments, convertible to new capital stocks via stock market mechanisms in an American economy. That is soon to surpass 14 trillion dollars per annum.

In addition, a supply-side, neoclassical, monetarist misnomer can derail the economy by exaggerating tax-savings and upward miss redistributions of national income for the phantom wealth-effect. They attempt to portray it as "new technology," and constructive to capital markets. They misrepresented the traditional tax breaks for the middle class, adequate salaries, and income adjustment as inflationary, causing a three trillion dollar, or at least, a 75 percent of three trillion dollar backlash, due to negative income effect.[7] That periodically further compounds the market failures (of the absolute free market mechanisms) known to neoclassical economics, combined with constrictive

money policy, and inappropriate banking and credit policies. Those circumstances plus President Herbert Hover's administration policy of noninterventionist myopia culminated in the (1929) United States market cycle depression.

The systemic policy miscalculations and upward misdistributions of circular income will periodically test the limits. Wealth-effect is supposed to generate more than sufficient income to fight oscillatory economic down cycles. However, 1 to 5 percent of taxpayers cannot generate such income-effects. They employ accountants to maintain a level, or a lower rate of redistribution of their income via taxation. Meganational corporations perpetrate the most harmful misallocation, which often underpays the treasuries in most economies. They effectively campaign against their 30 percent taxes, while they collectively only pay about 2 percent taxes. They have a huge impact on the local or regional economies. Naturally, that compounds their negative and positive externality-effects as well. The recent deep-sea oil disaster in the Gulf of Mexico will leave a thirty-year legacy bill for the United States. The chemical toxic influence on the major seafood industries will be a multiyear discovery of wonderment for all American taxpayers. Chernobyl in Russia has claimed a major portion of productive real estate for thousands of years. More recently, unregulated fracking for natural gas in southwest USA will claim untold ranches and small farmlands' water wells in USA.

Figure 4 shows some of the complex interdependencies of production process and real flow in modern economies. This is an economy with government involvement, a mixed economy, with system interdependencies built in it. This influences technological progress in multiple levels.

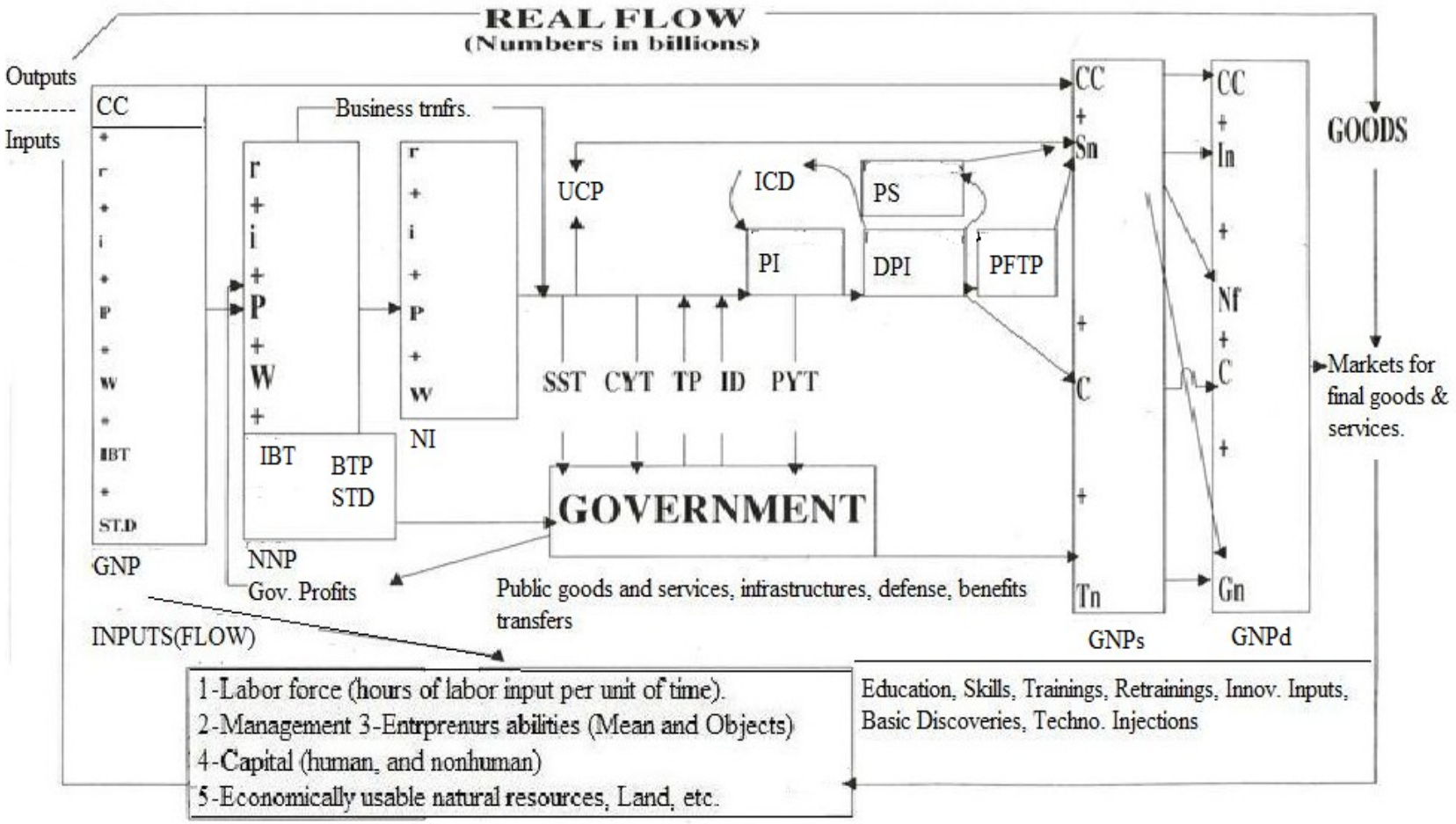

Figure 4. Real redistributive flow in modern economies.

Certain financial instruments like IRA (retirement accounts) are fixed-investments. They generate future income. Their present use will generate punitive tax penalties, by law. Hence, the likelihood of these funds to supplant circular real income of wage earners [the middle percentiles of earners] did not materialized. That is a false hypothesis.

Capital consumption (depreciation) is assumed "allowances for the using up of capital" by convention. The depreciation fund set aside is to equal to the replacement costs of capital, by assumption. Thus, this assumption leaves a large gap due to the following causes, and expenses are unaccounted.[8]

- Obsolescence.
- Replacement of small parts of machine.
- Wear and tear of capital stock.
- And capital entropy.

The more pure economic explanation of capital consumption, it would not be replaced by capital formation, and would reduce the national stock of capital, was presented in the writing of Friedrich A.V. Hayak.[9] In this model (of a closed economy with equilibrium among prices and costs), disproportional increase in inputs' share of production leads to increase in aggregate demand for consumption over aggregate supply of new products of the economy. Thus, increasing the ratio for prices of consumption goods over that of capital goods (this could be the ratios of expected revenue, or profits, etc.) leads to an increase in ratio of growth rates of the consumption goods over the capital goods. Thus, a cut in the formation of capital stocks (goods) occurs over time. Individuals consume a

portion of their income now. They also save it (or a portion of it) in order to invest that portion on capital stock for future production, and consumptions. Therefore, a shift to consumption types of production will devalue factories geared to make capital types of production, leaving technically operating plants useless. The generated revenue (the income flow from these kinds of capital stocks) will be short of the operating costs (including the depreciation and interest).[10] Thus, the physical deteriorations and more losses will follow the under-investment in capital stocks.

This process Hayak identifies as capital consumption.[11] There are major negative implications for an advanced economy. Lower level of living for the population is also included. There are all the political implications that follows due to the diminution of actual living (level of living) conditions; at least, there are mass population intra-immigration, or relocation, and job retraining. Even the capitalist modus operandi (and relatively free markets) will not escape some impacts.

Capital Consumption and Replacement

The challenge to accumulated capital stock, or at least, maintaining the value of it, is prehistoric. The reasons for the desire to accumulate capital have to do with what capital stock can produce, but they can be more complex than that. The following are some of the characteristics reasoning associated with ownership, or utility preference of capital stocks:

- More of it preferred to less.
- The desire for the level of living to catch up with the standard of living.
- It is a mean to reduce or replace individual physical work.

- It is a mean to reduce risk.
- Physical work is harder as individual age advances.
- As means to improve genetic preservation, offspring survival, success.
- New activities are more desired, their profitability exceed that of older activities.
- As a desired societal plan to improve level of living.
- The state or societal new plans exceed the benefits of the older plans.

J. M. Keynes studied eight different motives for the individuals who do not save and invest their incomes.[12] While only some of these have received the most attention, like the undersaving and miserliness, studies of all elements expound current understanding.[13] Personal finance studies most of these, in modern time.

Hayak explained the motivations for capital accumulation in the following way. The owners of capital stock want to maintain the income flow they receive from the capital stock, facing changes <risks> over time. Therefore, the quantity of capital stock becomes an issue, when capital stock is not permanent in nature, and the capital stock can even become obsolete before physically worn out (by use or entropy). When lenders loan funds for the purchase of capital stock, they must find an estimated nominal value for it, a flow of future revenue from it, and a mechanism to maintain a reasonable constant value for the assets to cover the liability of it in the double-entry bookkeeping style of the venture capitalists. Therefore, the institutional desire to make these practices into laws was due to accounting need of the lenders.[14]

Capital consumption is a calculated nominal sum from the flow of production. It is a set-aside from income flow produced by the use of capital stock

supposedly engaged in the process of production. Gardener (1978) wrote, "...it must be recognized that in practice we have no true measure of the capital goods that wear out or become obsolete in any given year and are replaced from the current production of new machines." He then noted the changes made since (1976) in using "estimated aggregated depreciation" rather than the accountants' method.[15]

Capital replacement is the amount of the saved fund (flow), which will go to physically replace the capital stocks. However, depreciation and replacement are not equal over time.[16] In cases where the replacement is not equal to depreciation due to growth and changes in prices, technological advancement and inflation alteration precipitates a revision in production and growth models.[17] There is a new development in this area of research related to impact of technological advancement on capital stock. When parts of old capital can be replaced with new and improved parts, the technologically embodied newer parts affect costs and final output, and with higher flow of goods and services. This area is different with initial purchase of new capital stock, which can already embody the most advances in technology.

Depreciation is equal to the value of capital less its salvage value. (The resale value) divided by the life span (useful life) of the capital. This is the straight-line method of calculating the depreciation. The economists of all creeds have acknowledged its impacts.[18] In dynamic analysis with growth , the share of funds going in the depreciation fund accounts will not be used up for replacement, because there cannot be a incremental addition to the capital stocks.[19] Thus, replacement of capital stock can take place in n-periods from initial purchase, but it is not the same phenomenon as depreciation.

However, it is commonly assumed that depreciation exceeds replacement.[20] While with high rates of growth this can hold, there are particular conditions in which it will not hold.[21] Under the following conditions, it cannot hold: if the rate of capital price inflation is higher than the rate of increase in depreciation funds, or the rate of decay exist, or the rate of growth is weak and insufficient. The depreciation fund falls short of the replacement fund.[22] Thus, the rate of change in depreciation set-aside nominal fund must exceed the rate of change in the price of capital (index), or (dcc/dpc>1). Other economic scholars have studied some impacts of this study in macro economy. Marx (1862) wrote, "...the existence of this fund partly account for the very different rate at capital accumulates in nations with advanced capitalist production and hence great deal of capital fixe, and those where this is not the case." There were more developments on this topic. The percentage shares of gross investment going to depreciation fund, and the shares going to replacement fund have been estimated.[23] This work defined "Lohman-Ruchti effect," (1954), and Domar capacity effect (1946-1954).[24] Thus, Domar calculated the shares of gross investment going to the deprecation fund and the ratio of gross investment share going to the replacement funds, using constant data.[25]

Formulation of New Capital Stock

Reformulation of the traditional approach requires calculating the difference between the capital consumption fund and replacement fund, using percentages given by Domar formulation (D/G) and (R/G) then recalculating the data. Therefore, the traditional depreciation divides in its two new components, the replacement part, and investment net of the depreciation part. This should produce investment net of the capital consumption

fund (INCC, IND) and a replacement fund [R]. Thus, adjusted net investment (ANI) will be the addition of the replacement fund to investment net of depreciation. Theoretically proven by the following mathematic formulation, gross investment must remain the same in the static case.[26] However, capital stock must increase since the incremental changes in capital formation will increase.

$$(ANI > NI)$$

In case of a dynamic economy, the increase in stocks of capital logically and theoretically should generate more economic activity, mutatis mutandis. Here, technologically enhanced capital stocks inject life in the economy. Hence, a greater gross investment and a greater gross domestic product, and gross national product should follow, until the aggregate demand fails, and the business cycle turns down. At some point in the business cycle, the firms decide to stop putting more fund-flow into their business activities, because their local or global consumers decided not to buy the final products.

The following equations show the depreciation, replacement, and net investment and adjusted net investment formulations.

Given: $CC = INCC + R$ OR $D = IND + R$

$NI = GI - D$; $NI = GI - IND - R$; OR $NI + IND = ANI$

$ANI = GI - R$; OR $GI = ANI + R$; OR $GI = NI + IND + R$

Yet, the negative impact of funds taken out of present consumption, to be returned in future time in order to be spent on replacement to maintain and increase aggregate supplies, would leave an anemic aggregate demand now. This will cause a downturn in the economy in the present period.[27] This also can lead to the potential for an inflationary

push in the future period.

Formulas from the capital stock produce an estimation of the new capital stock. Accounting for the impact of the replacement fund added on, for new capital formation shown as (ANI). The new capital stocks formulas are as follows:

$$CS \equiv CS_1 + dCS_1$$
$$K_2 \equiv K_1 + NI_1$$
$$K_2 \equiv K_1 + ANI_1$$
$$\{[AV.(\frac{dGI}{dGNP})] * GNP_1\} + ANI_1$$

These are estimations for present stock of capital. That is, the average of capital coefficient ratio over the production period multiplied by the GNP of each year, plus, the incremental addition to capital in the current period (ANI). Note that (ANI1) has been traditionally calculated as (IN1).

The study of the following graph will show some of the interdependencies of aggregate supply and demand involved. Capital stocks produce consumption goods, and adjusted capital stocks are part of production process. They are producing while being produced, in the temporal investments time span.

The traditional (classic) rents, profits, Interests, ands dividends, are added to other pools of capital flow. The funds from workers, retirement funds, are added as part of the same pool. All these funds are invested the capital stock, to form the adjusted net investments.

Figure 5 shows the real flow chart and complex relations, which converts fund-flows into adjusted capital stock. The outdated notions that workers' savings do not contribute to capital stock, should become very clear.

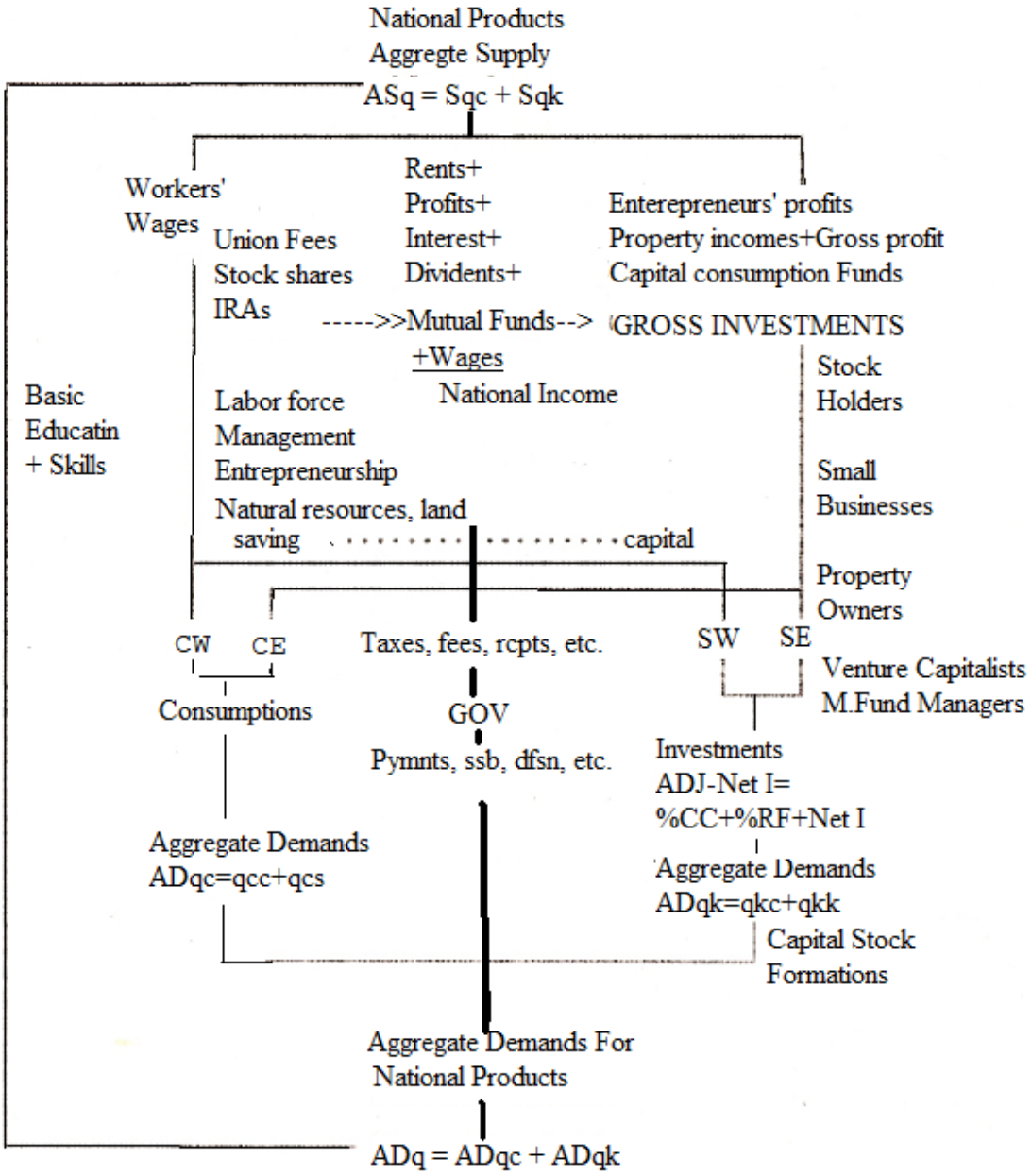

Figure 5. Production process flow chart in modern economies.

In this model, aggregate funds from all classes, workers, executives, and government employees' pool invest together, in ultimately new technologies, traditional and adjusted new capital stocks. If there are dishonest attempt, fraudulent hedge funds manipulations and chronic assaults around and on regulatory market mechanism by huge monopolistic operations. Those national and global financial security issues, require to be corrected quickly.

Technologies and Exchange Surpluses

Producers and consumers benefit from normal trade. Figure 6 shows the demand side and supply side surpluses created by technological injections.

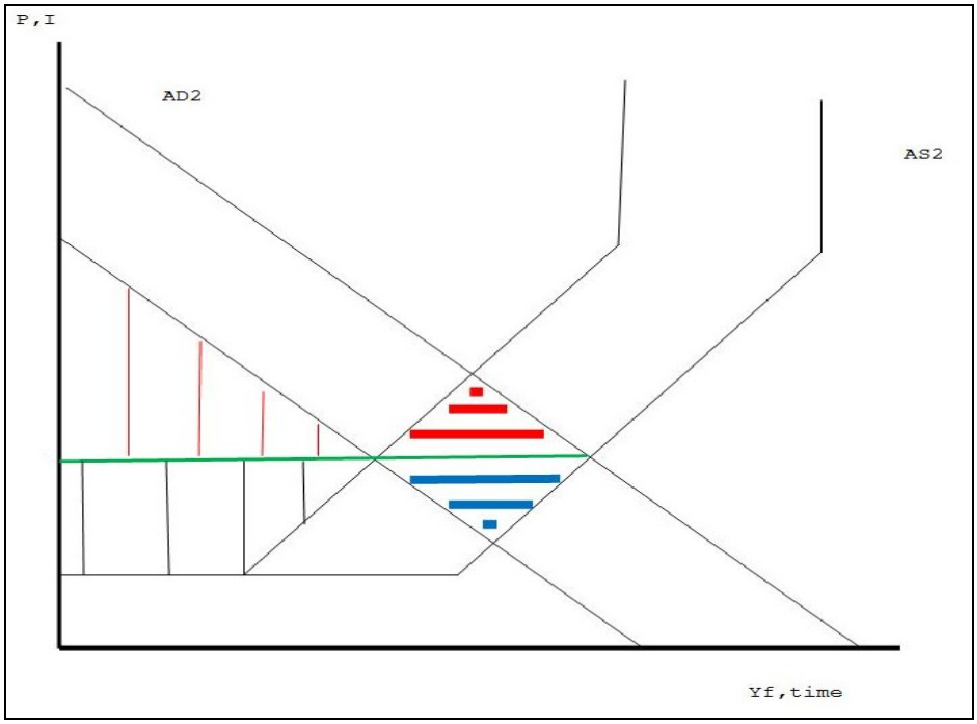

Figure 6. Consumers and producers' surpluses from technological injections

Aggregate demand (1 and 2), and aggregate supply (1 and 2), are represented by AD and AS. Here, the added gains from technological injections are presented.[28] The gains induce trade and adaptation of technologies, above the inducement to engage in traditional trade.[29] Traditionally, the surplus shows the beneficial aspect of trade, which induces the producers and consumers to give up a portion of their products and earnings in exchange of what they require.

Rate of Supply Injection of Technologies and Macro Economy

The rate of injecting appropriate technologies in an economy needs to meet the capabilities of that economy to absorb the injection, with complementary systems in legal structures, and functional infrastructures, and mechanism that would gradually increase actual employment without inflationary disequilibrium, and crippling bottle-necks. Misapplications of available technologies can create other sets of inappropriateness in use versus selection that can also become a financially crippling proposition. For example, a new technology may be useful in a small sector of the economy, and its fast application can add to commerce in that region. However, as an unknown entity, it can cause comprehension and uncertainty in a larger sector, and shut off flow of capital to that region over time.

Figure 7 shows the supplies of technological advancements. The more elastic supply side demonstrates that for the same amount of technological shift in supply side, more income and full employment will be forthcoming. LT and UY show liquidity, and unemployment traps, Y is real income in macroeconomics.

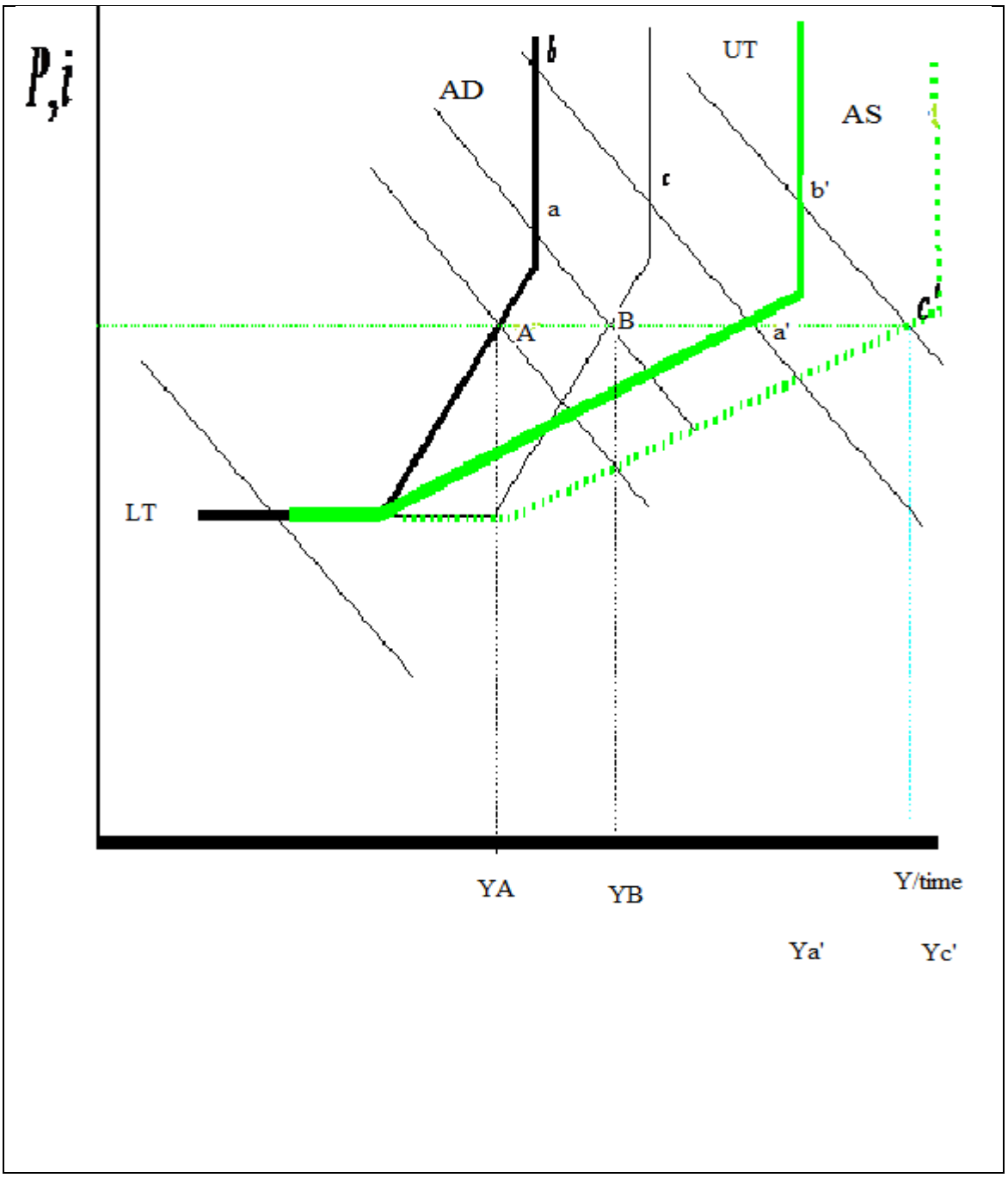

Figure 7. Speed of technological diffusion and macroeconomic implications.

In case of fast diffusion of technologies, prices and interest rate tend to increase much more rapidly in the short term. In the longer periods, employment will increase, and price and interests can adjust back down. The diffusion of technological changes at a slow rate will have a much larger impact on employment after the same adjustment in aggregate demand reduces the short run implication of higher prices and interests. However, if aggregate demand remains unchanged, a deflationary phase will affect the economy.

In the region of a liquidity trap, no price and interest adjustment or fluctuations take place. The additional investment in transfer of technologies will remain unrealized until all of the current capacities of utilization take place, but employment will increase if aggregate demand increases. Aggregate demand and incomes will need to increase substantially before price and interest are impacted.

This situation in most economies can be a great moment to advance the economy for the good. This is when technological injection and capital formation can be most productive and do the most good to increase employment in the economy.

In the region of an employment trap, assuming full employment of all factors has not occurred at (a), the supply injection reduces inflationary shocks due to aggregate demand increases at (b) to a manageable level at (c). The rectangular box of Y-axis and points (a) and (c) quantifies the substantial increase due to employment. The difference is, a slower diffusion rate approach as shown by (a' b' c') versus (A, B) will create more employments, when prices remain stable with changes in technological advancements. There the social benefit surplus is demonstrated by the rectangular box of

Y-axis and (A) and (B).

The elasticity of aggregate supply generates different levels of benefits for the economy from the injection of technologies in that same economy. Figure 7 deals with two assumptive conditions. First, one is the inelastic aggregate supply and injections of technological advancement. Second, one is the elastic aggregate supply and technological injection. Graphically, we can analyze the return from full employment will be greater for the second case, of elastic aggregate supply boxed by Y-axe and points (a', c').

The elasticity of aggregate demand also adds complexities to the analysis. Examples are numerous; technological injection supplies a great product. Initially expensive, but as the demand increases, new means of producing it or a substitute product will flood the market. The price of it and a substitute decline.

Factors like monopolies, organizational blocks, legal manipulation, and market imperfection can subvert the market normalcy. That will cause constant and inexplicable price hikes that confound logic.

The moderate slope in the demand curve will cause smaller initial price increases. However, in the longer run, the trend will be higher prices with a shift in the demand curve. If there are inflationary pressures added, those price increases will be higher.

The supply side shift due to new technological innovation and products developments would reduce those price increases substantially. The technological injections, in Figure 8, show a reduction in the prices and interest rates, even when the income increases, unless the increase in income is higher substantially.

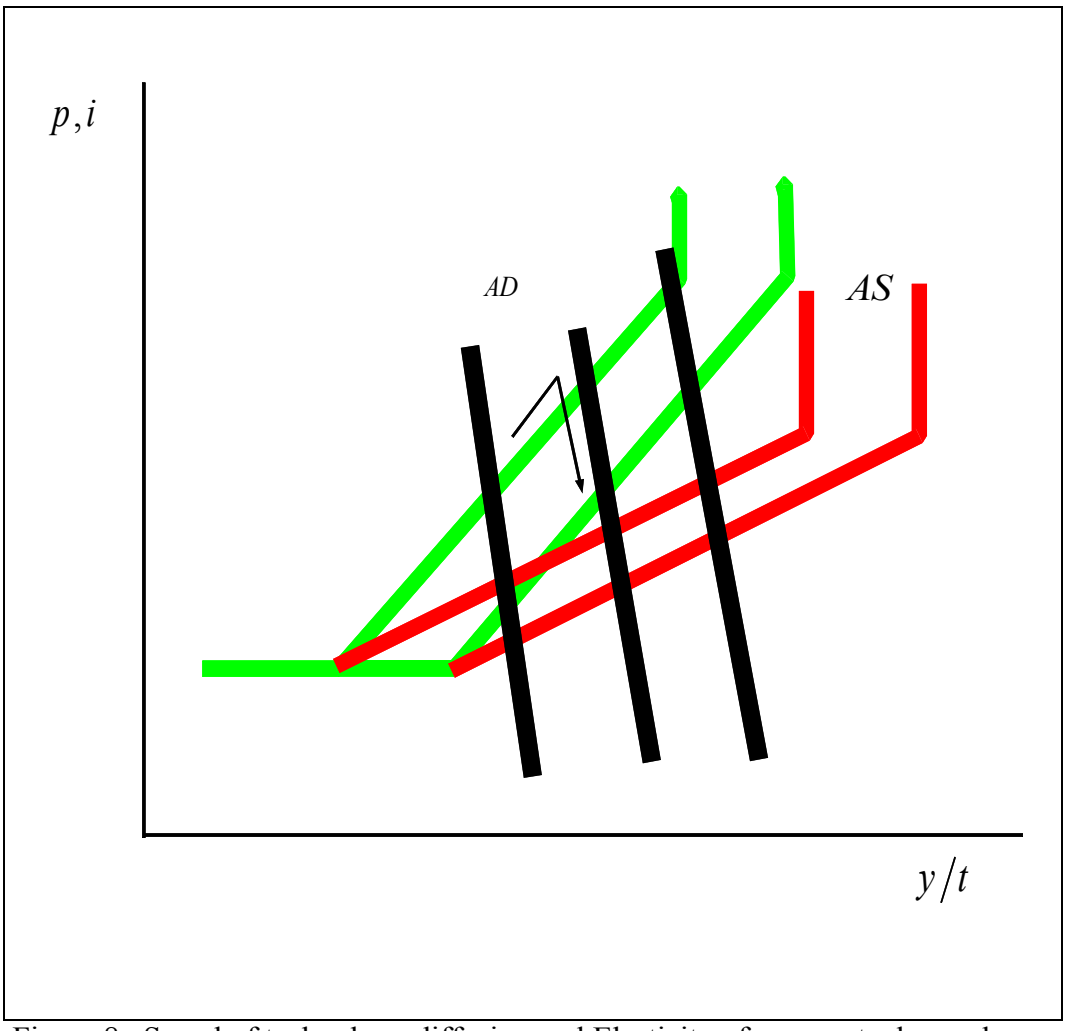

Figure 8. Speed of technology diffusion and Elasticity of aggregate demand.

The more inelastic aggregate supply curve (AS) does not allow price and interest modification to significantly impact the market.

Ask yourself an intellectually stimulating and profound question about the health care costs paradox. Health care is very inelastic. The body of knowledge in health care increases substantially or even doubles every six months. The annual increase in health care costs to consumers (HMO and other health care plans) is going up 10 to 30 percent per year, while consumers' (workers') income raises limit annual workers' demand increases at or less than 3 percent. According to our graph and science of economics, the

prices over costs should be dropping substantially at much smaller changes in demand curve, and modest technological injection in the fields of medicine. However, the technological advancements in the fields of medicine are almost as great as in electronics. While prices of your computer drop, the costs of medicine are still leaping. Totally contrary to the facts, the prices and costs jump to astonishing self-crippling heights.

Notes

[1] A large number of intellectuals, academics, businesspersons, and publishers were more responsible for President Hoover's noninterventionism as a depression era policy.

[2] Q.E.J., 1951, 425

[3] P. A. Klein, G. H. Moore, *Monitoring Growth Cycles in Market-Oriented Countries*, (Mass.: published for N. B. E. R., by Ballinger publishing Co., 1985), 4-9, 347

[4] E. Kay Hunt and Jesse G Schwartz, *A Critique of Economic Theory*, (Maryland: Penguin Book Inc., 1972), 237

[5] W. J. Baumol, *Economic Theory and Operational Analysis*, 4th ed., (New Jersey: Prentice-Hall, Inc., 1977), 667, 669

[6] Paul Anthony Samuelson, *Economics,* 11th ed. (New York: McGraw Hill,1980), 176, 188-189, 194

[7] A recession possibility is about [55-70 percent] in 2007-2008 economy. Who imagined a <depression>?

[8] Samuelson, 116

[9] The reprinted copy was handed out in Late Professor (of emeritus) Ernest William Randa at University of Utah. Initially, it was printed as "Kapitalaufzehrung" in Weltwirtschaftliches Archive 36 (1932/II), 86-108

[10] J. M. Keynes attempts to distinguish between disinvestment, selling of capital assets, and capital consumption as defined here. He stated in the "General Theory," he could not find a reference for an explanation for the Austrian definition of capita consumption. Yet, he wrote an extensive expose with examples on the subjects of capital depreciation. J. M. Keynes, "The General Theory of Employment, Interest and Money", 76

[11] F. A. V. Hayak, "Kapitalaufzehrung" in Weltwirtschaftliches Archive 36 (1932/II), 86-108

[12] Precaution, foresight, calculation, improvement, enterprise, (speculation, and business project), pride and avarice (habitual miserliness) were among those element mentioned. Keynes, J. M., T*he General Theory of Employment,* 107, 108

[13]. John M. Keynes, *The General Theory of Employment, Interest and Money*, (London Royal Economic Society), 107, 108

[14] Ibid, 294-305

[15] Ackley Gardner, *Macroeconomics: Theory and Policy*, (New York: Macmillan Publishing Co., 1978), 32

[16] E. D. Domar, *Essays in the Theory of Economic Growth*, (New York: Oxford University Press, 1957). In cases that replacement is not equal to depreciation, revision in economic models will be needed. Thus, Domar suggested, "a revision of, the existing models <by Harrod, Felner, Domar> become necessary."

[17] E. D. Domar (1959), 168

[18] Domar, Hansen, Hayak, Keynes, and Marx have covered the subjects.

[19] K. Marx, (in a letter he wrote to Engel, dated 20 August, 1862, London), (handout by late professor Randa, 1998 and 2004)

[20] R Eisner, " Depreciation Allowances, Replacement Requirement and Growth," *The American Economic Review*, XLII, December, 1952

[21] R. Edwards, "Depreciation and Maintenance of Real Capital*," Depreciation and Replacement Policy*, Amsterdam, 1961

[22] This was noted by Edwards (1961); he wrote: "That given some rate inflation there is some real rate of growth will just compensate for the inflation induced deficiency. A more rapid rate of growth would yield excess funds."

[23] E. D. Domar, *Essays in the Theory of Economic Growth* (New York: Oxford University Press, 1957), 154-167

[24] Evsey D. Domar formulated the ratio of ratio of replacement (R) over gross investment (Ig) and the ratio of depreciation (D) over gross investment (Ig). Growth investment grows at an annual rate of (r), for (m) years, by this formulation: [(1+r) ^m].

[25] Domar's (1957) formula for both ratio was as follows: R/G = 1/ (1+r)^m and R/D = r*m / {[(1+r) ^m] - 1}. The inflation case, given (r) is annual growth rate of gross investment, (u) rate of investment growth, gives us the price increase as (i= r-u). Thus the result formulas look like these:

$$R/G = [(1+i)^m/ (1+r)^m = r*m / \{[(1+i)^m] - 1\}$$

Given: m, years; t is the period since initial use, and t<m:

D/G = {1-{1/[(1+r)^t]}} / r*m

[26] Keynes, 99

[27] Keynes in "General Theory" (pp.100-102) uses two example, United States five year prior to 1929 depression; and United Kingdom 1935. He used Mr. Kuznet's data to show a decline of net investment from (1929) to (1931).

[28] Edward Joshua Mishan, *Cost-Benefit Analysis,* 4th ed., 1988
William J. Baumol, *Economic Theory and Applications Analysis*,4th.ed., 1977

[29] Jack Hirshleifer, *Price Theory and Applications* (New Jersey: Prentice-Hall, 1976), 184

CHAPTER 6

TECHNOLOGY, ECONOMIC WELFARE, AND GLOBAL ECONOMY

Global economy is defined around the larger national and international businesses, mistakenly or by design. It will include the larger formal and informal smaller entities, individuals (wheel, donkey, bicycle, motor bikes, trucks, boats, etc.) in a variety of locations and shops. It includes small farmers, and their distribution means.

Globally like locally, the aggregate demand creates (up to 75 percent) the economic activities for the global gross national products. That remains mostly dependent on the consumers.[1] The majority of manipulated international laws favor transnational corporations. That in itself is not a bad thing. They consume unfinished products themselves, unless they decidedly corrupt the systems for other users.

The closest analogy is the corruption pandemic with drug cartels, when they subvert embryonic democracies with laundering and trafficking. Most over night for quick profit corporate operations (short termers) leave substantial instabilities and dislocated lives that overwhelm the embryonic or nonexistent government infrastructures. In any such regional economies without infrastructure, technological injections need far more analysis for appropriateness.

It will be much more beneficial to have local interested parties, firms, and authorities with longer-term strategies study appropriateness of technologies affecting lives. However, international systemic barriers designed by treasuries and central banks in

tariffs, exchange rate difficulties, transaction complexities, confiscatory laws, will prove fatal to all small regional clean transactions. The negative externalities and unforeseen affects on international commerce and exchange are also substantial. The multiregional financial implosions of the 1990s in South East Asia and South America, and their impacts on the United States are a testimonial against voices of heavy-handed anti-free-market regulators. While resources are wasted and scattered in the face of inappropriate regulations against all small transactions and transfers of safe nonmilitary technologies, the larger firms' transactions of multibillions of dollars constantly find legal strategies around such laws.

The other fundamental monetary difficulties with appropriate technological transfers and related capital formations are in reasonable exchange rate fluctuations. Recently, arbitrage and speculative aspects of exchange rates have passed the realm of countercyclical balancers into financial crises creations, and economy destabilizing, beyond capacities of small governments or institutions to remedy, or counterbalance them. Again, what seems logical is to maintain small transaction currency-exchange zones by all international institutions, or by varied central banks for a reasonable transaction rate. Then, increase focus on major transactions-transparencies, and regulate the extremes, which can destabilize global banks.

Of course, all criminal transactions will be subject to prosecution and law as is and as the links are unavoidably established and proven, not by assertions, but by proof. However, empty boastful verbiage and unconstitutional assertions of baseless illegalities cannot bankrupt the greater good of free trade by smaller entrepreneurs, legitimate educational uses, health and food, and agricultural and small manufacturing

productions. The resulting backlash targets democratization and free trade and bleeds national securities.

There is the more recent notion that presents ethno-theological monopolies, mainly sociological anomalies other than "ethnic hate," as proof of capitalism's failings in a large number of developing systems. Alas, as a subcase study of monopolies in market and political arenas, there are many market irregularities, as examples of inappropriateness of economic and political technologies, transferred to developing economies. Relatively perfect competition and democratic mechanism are still primary and secondary conditions required for sustainable economic success. There are other certain assumptive corrective requirements essential to avoid these endemic ubiquitous system failures. Hence, I present this study of the complex mechanisms of dynamic appropriate technological advancement to assist in the corrective actions.

Income and Substitution Effects and Technological Changes

The study of sustainable development refocuses new resources at serious global issues. Water use, energy source and energy use, their impacts on global warming, health and food (feed) shortages and misallocations, and global population explosions after regional wars are not new problems. However, the recognition of the magnitudes and speed of collective impacts of mainly consumer-oriented technologies and production processes on minimum sustainable biodiversity is pronounced and immediate. Ignoring the evidence, does not dissuade the consequences. This is not an alarmist's quandary, or nihilism. Nevertheless, some species have already paid for this with their lives in permanent vanishing acts. Therefore, doing nothing and not even studying the matter is a

self-defeating concept, it will metastasize into a foolish notion over time. Abusing resources will not help, especially if they are in a style induced by madness of crowd and mass media hysteria, by wasteful world war revisionism, militarism beyond defense and clear dangers, by government size, by waste and fraud, by destructive bends, and movements leading to financial implosion, common to some leaderships of the last millennium. Perpetuating famine, medicine resisting bacterial diseases and other viral infections, and AIDS, hegemonic bents, and related violent moves and countermoves are not glory-ideas for humanity. They afflict all lives. Such silly delusions and other misinterpretations of modernity need more contemplation, in true democracies, and in free intellectual environments, and with sound international laws and courts. These all will need to be reintroduced globally.

If current levels of outputs were produced with early 1900 technologies, the level of death from pollution and lung diseases would even astonish mindless apologists of the worst kinds of capitalism, as it did in the coal mines of the United Kingdom or industrial smog of northeast United States and England in the early stages of industrial expansions.

Nevertheless, technological changes have evolved in the same two nations and others gradually to less polluting and toxic production processes and better level of living[2]. Multiple infrastructural supports and substantial transformation of resources and human capital forms across the globe, with a substantial number of new technologies in the form of institutional rules, new laws, and private property laws fortify the otherwise illusionary sustainable development out of cyclical growth.

The following model explains this phenomenon. The X bundle of goods and services reflect the older technologies requiring increasing usage of carbon-based fossil fuels, more polluting than alternative processes or methods.[3] Y bundle of goods and services are more appropriate and less polluting technologies, smaller liquid-gas (propane, or butane) cooking or water-pumps in more villages and rural settings, better automobile engines (H-cell or dual fuel), and cleaner factories in larger urban cities. Initially along budget line (I1 I"2), at (E'1) the true price of bundle X will increase showing health and environmental costs.

However, as we run out of the fuel, this will lower the consumers' income and it will rearrange the production and redeployment of resources at a different production possibility frontier, shown by income (budget) line (I1 I'1) at (E2); this shows a major reduction in consumption of X. Consumers will soon recognize the benefit of reduction in purchasing X and larger amounts of Y that they can consume instead. The substitution of Y for more costly X at (E1) is the substitution effect. This again reflects different technologies and resource allocation. The positive externalities or consumers' benefits are measured by (I"1 E1 I2) and their negative externalities from the change will be equal to (I"1 E1 I'2), the loss related to the increasing price of X. In a sustainable development model, a large injection of income, more education, and retraining will entice other shifts for using more of Y bundle. At the new budget line, shown by (I3 I'3) at (E4), the consumers will be better off. Nevertheless, in a developing economy, this may prove to be more of a complex proposition than proposed on our campuses or political halls, if even discussed anymore.

That is, with a new set of technological innovation and rearrangement of political organization, positive changes can take place. With political and financial leadership, a nation can retool, "reset," for a better path of economic expansion.

As the energy-using bundle prices get cheaper, the consumers will use more of that. However, as resource shortages are more documented, the prices of the energy-using bundle will increase substantially. That is why a strategy and training for the inevitable future in the energy saving bundle of goods and services will benefit the consumers and prepare them for a difficult but inevitable future moves that awaits them. The supply of the energy-using bundle of goods will last a few more years. We will use the electric train, fueled by new energy, a combination of solar, wind, and gas.

In Figure 9, the indifference curves are shown by (I I'); Y and X are different bundles of goods. The indifference curve slope changes when price of one bundle of goods falls relative to the other (I1 I1') changes to (I1 I1"). Dynamically, as income level increases, so does uses of both Y and X. Technological advancement can influence the slope of the indifference curves and relative uses of each bundle.

In Figure 9, the notion of added social benefits from consumer surplus isstacked up in vertical phases from (Y1E1 E2 to Y) to (Y2E4E1Y1). While traditionally, that is a great addition from technological advancements, the resource limitation or specifications require more refocus on types of technological changes. That is in line with the logics of this dissertation. Therefore, a technological injection in line of energy-saving bundle of goods and services will also increase consumer surplus and social benefits. The consumer and social benefit surpluses shown by (XE'4E2X) are also an expansion.

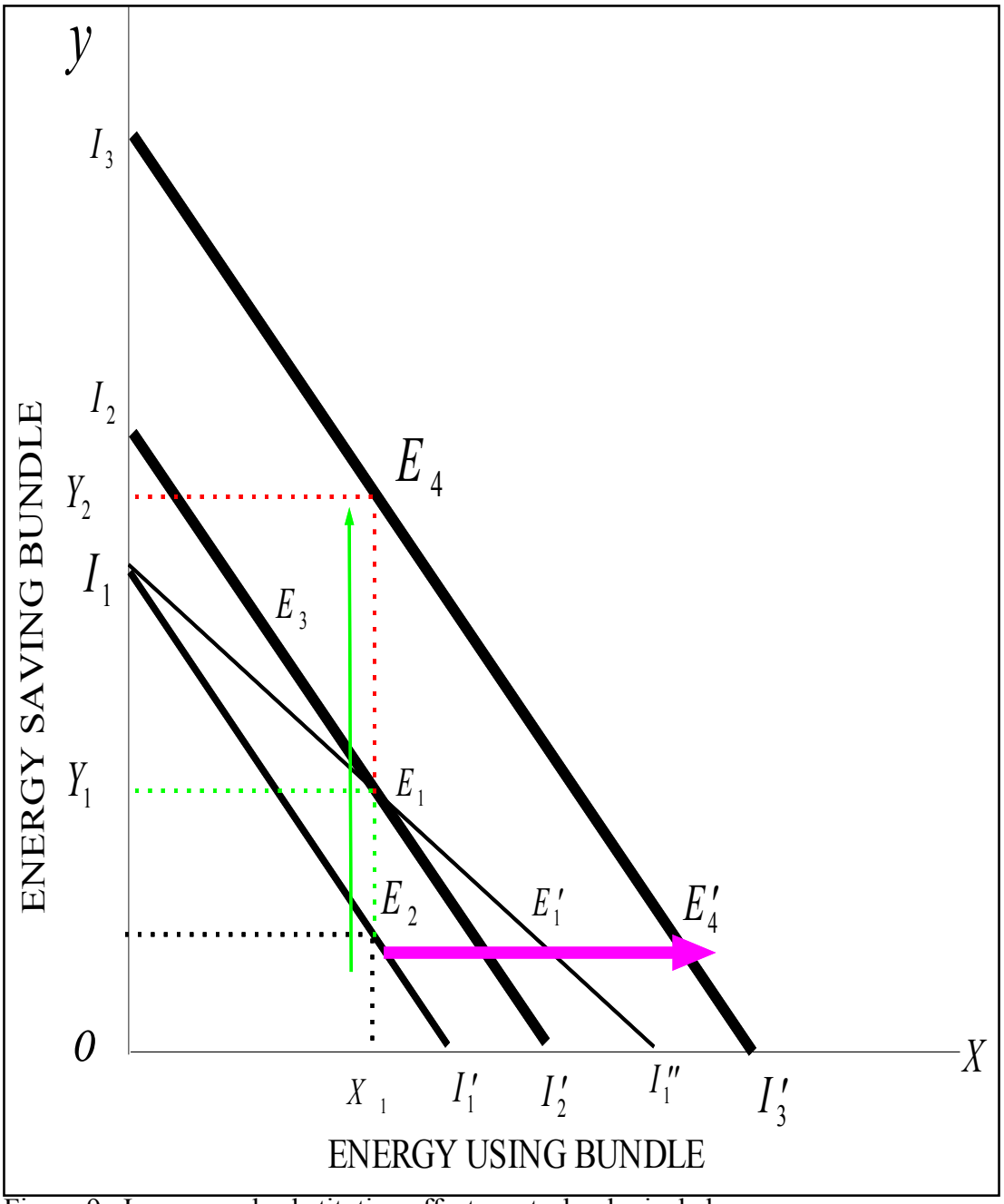

Figure 9. Income and substitution effects on technological change.

Therefore, in most cases, we adopt technologies to arrive at (E'4) for sustainable economic developments. We really need to plan to be at (E4), wasting much less of diminishing resources. This results in some very peculiar nonmarket notions as well. One is that cheaper or subsidized fossil fuel is just beneficial to sustainable advancements of economies, ignoring efficiencies, that market price will deliver, or negative externalities, which true prices can modify. Will a free car to every human on earth strictly benefit humanity? If every village had a coal factory, will the globe survive their benefit? The fallacy of composition is not too hard to grasp, but it will not always survive the stronger notion of private gains.

The temporary discourses from the Pareto optimal allocations and economic welfare equilibriums alone can be difficult to overcome. Gather all random Nash-disequilibrium you wish, you will not add them up to a Pareto Optimum Equilibrium Stable system. The ample application of Keynes and monetarism propositions were fought past the 1929 business cycle, until the conservatism of Hoover-ism, (a peculiarly implied market notion: we broke it, but will not do anything to fix it, because it will eventually fix itself) was circumvented during the F.D. Roosevelt presidency job-creation laws. Moreover, C.C.C. projects (Civilian Conservation Core), social benefit packages, and World War Two expenditures (redistributions) reallocated temporal purchasing powers to restart the engine of the USA economy in 1950s.

In an economic reality, even those with wealth get hurt in an economic depression, and cheap labor is meaningless to all producers when no one will buy the products. The first proposition is often totally ignored, or fought as redistribution of

income. The very people who benefited from the mixed economic strategies called it a socialists' notion, while a few decades before, in the bad economy, they backed President Franklin D. Roosevelt on every law he asked to launch his economic plan. It is not without cause that it is hypothesized here, that perfectly free market economies are chronically deflationary, because they tend not to be perfect, nor always free, nor do legal and political institutions understand the damage they can do to the structure, as they accumulate rules or centralize power, eroding the same systems. Nor do they understand the problem of national wealth-concentration versus national wealth creation and the significance each play in the economy.

It is a matter of life and facts that most developing economies do not have the sociopolitical infrastructure commonly taken for granted in the advanced economies. In addition, moving from one phase to another creates great taxing on fragile systems. The process requires not only newer appropriate technologies, but also means to adopt and improve the technologies dealing with bottlenecks, as they form in the process. These are facts reflected in the major injection of income, as the budget line shows in the graph. It also reflects the need for food, medicine, the minimum infrastructure required, before any sustainable strategies for economic growth or development will successfully function. Sustainable growth and development strategies are not mutually very exclusive, and they are dependent theories. They reflect the economies around them. They are not definitely one-time money injection in an economy that is the most common mistake made regularly.

Figure 10 shows the societal utility of production and consumption (S = D) frontiers, the sum of all hypothetical Pareto possible solutions society chooses from bundles x and y combinations possible. All productions and Pareto optimal allocations of

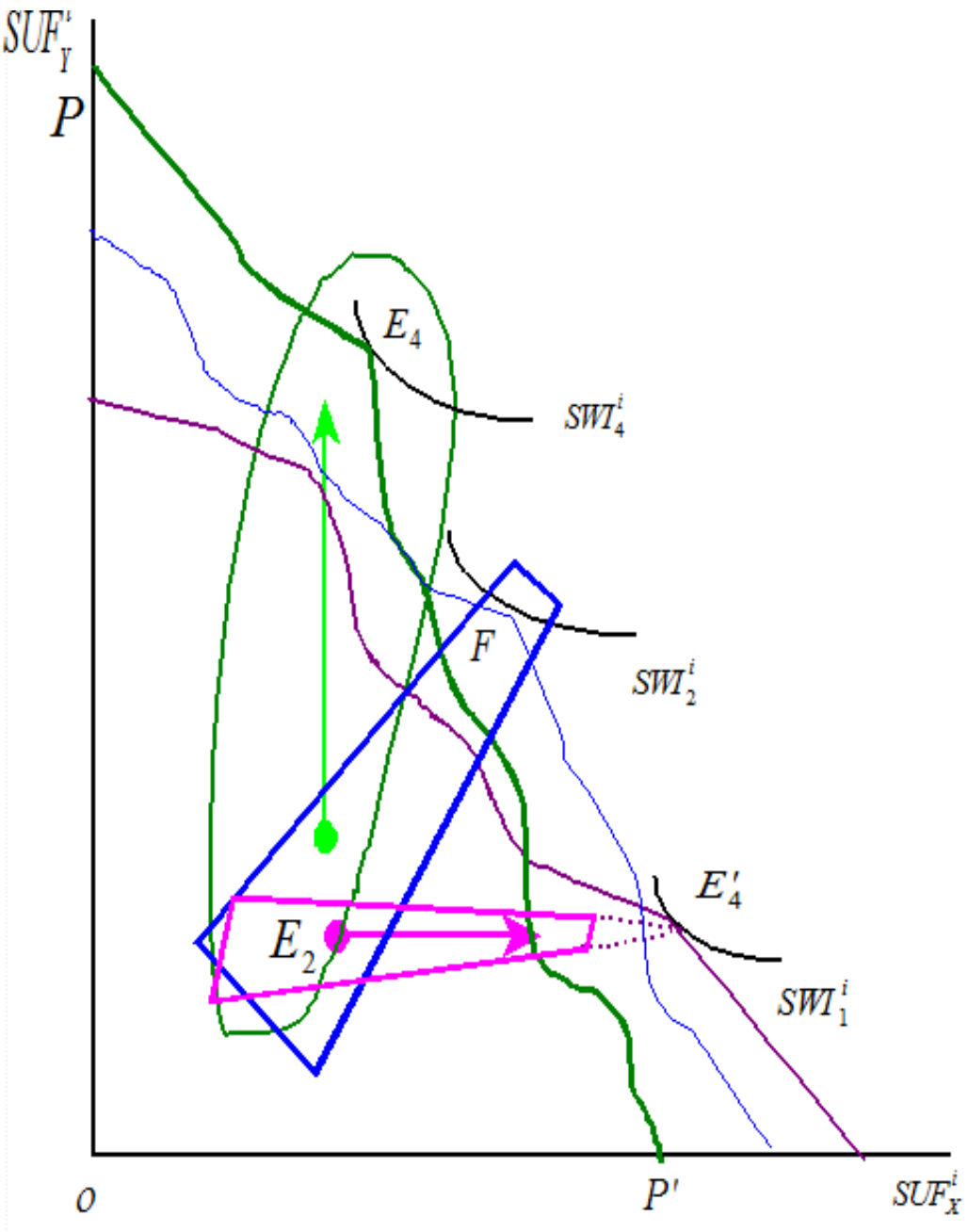

Figure 10. Dynamic societal utility functions and indifference curves.

economic activities of supplies and demands fall within the three sets of societal utilities and production frontiers.[4] Naturally, all productions possible (for the time span) with all technologies will fall within these sets.

We have accumulated a long list of unfortunate private and governmental attempts to transpose development models, mostly along a projected line towards (E'4) in less developing economies. Yet, gradual and segmental movements toward adaptations of more appropriate technologies and improved production processes will prove more beneficial in the longer run, when such adjustments occur.

Social welfare indifference curves reflect choices and satisfaction possible such that there are sets of points, which are preferred and do benefit the global well-beings, and meet the minimum required limits for the survival of biodiversity, versus resource limitations and other sets of points. However, we cannot represent this as unique solution points, because we are studying societal norms; individual Pareto Optimal points of satisfaction fall on or within the bounded sets of numbers in the graph. In a way, they feel unharmed with benefits or compensations. It is at E4, with more of appropriate technological advancements and sustainable progress, and higher and improved satisfaction exists using more of Y bundles of goods and services. This process uses updated appropriate technologies, with optimum employment and income to justify and meet such prices. Either movement from E2 will be a considered an improvement. Figure 10 refers to the dynamic societal utility functions and indifference curves, and global analysis using set theory and dynamic welfare theory. The resource limitation and population explosion constraints show in the narrowing of the sets in the later period.

However, at E4, we have a higher indifference curve and possibility for sustainable progress, even with globally active economies. The welfare- production possibility frontiers reflect different technologies and periods.

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Notes

[1] Richard E. Caves and R.W Jones, *World Trade and Payments, An Introduction*, 2nd ed., (Boston, Little, Brown and Company, 1977)

[2] Peter H. Lindert and Charles P. Kindleberger, *International Economics*, 7th ed., (Illinois: Richard D. Irwin, 1982), 44, 481-491

[3] Jacob Viner, *Studies in the Theory of International Trade*, (New York: Harper & Brothers, Publishers, 1937) , 521-522

[4] Jack Hirshleifer, *Price Theory and Applications* (New Jersey, Prentice-Hall, Inc. 1976), 438-443

CHAPTER 7

TECHNOLOGIES AND ECONOMIC WELFARE THEORY

A systematic analysis using set theory helps us to understand an otherwise complex and abstract conceptual whole; this unfolds over a longer time span into smaller parts. The basic economic assumptions are not abandoned. The higher utility is preferred to lower utility, welfare frontiers are first reflected at the outset of the same period frontiers, but in the final graph, a frontier TT' is used to show long-term social welfare frontier enveloping the outer extreme of intertemporal social welfare frontiers and multi-periodical utilities at (t0 t1) as indifference curves (SWI). Each bounded set shown as (E or F) reflects series of points, which mean more than the Pareto Optimum locus of individuals' satisfactions at different levels within the set, reflecting decisions on appropriate technologies pricing and governance, would leave resources for future economic activities.

Figure 11 reflects the limitation of technology duplications even if these are pollution-causing problematic technologies and strategies, which would strip resources and render urban centers too toxic for normal life. Therefore, it operates in order to meet some future needs, but it will fall short of global economic needs. Social welfare function is (SWF), and production possibility frontier is (P P').

The bounded set includes more than the Pareto Optimum locus of individuals' satisfactions at different levels within the set, leaving resources for future

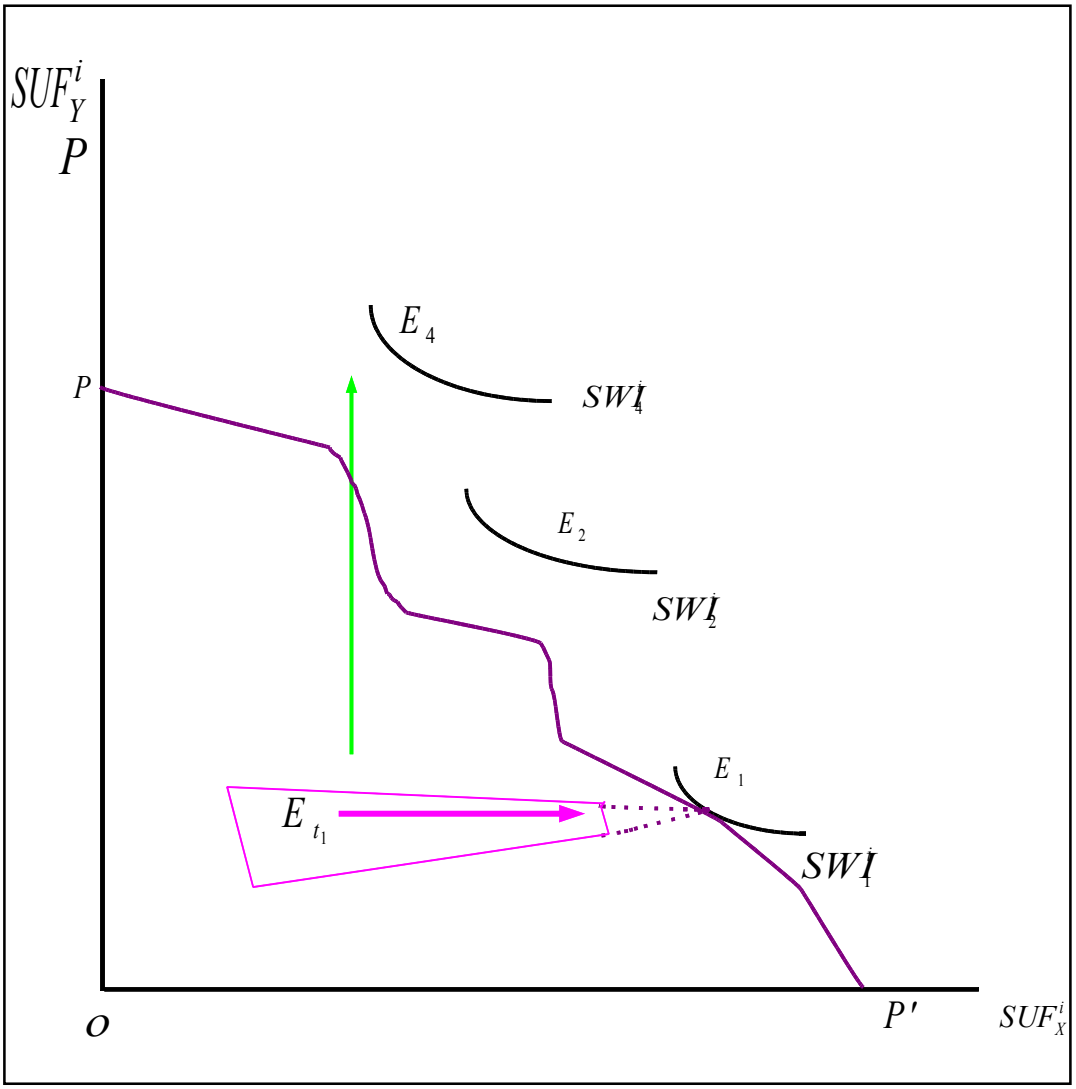

Figure 11. Dynamic social welfare utilities of technology duplication.

economic activities. However, these require less consumptive extensive level of living, and generally less market imperfections and more true costs (externalities linked prices), than at this bounded set. The bounded set does not narrow but either stays the same longer or expands over time, reflecting the intertemporal investments in appropriate technologies and increasing consumer Pareto Optimum and preferred satisfactions in the future, by diversifications of resources and prolonging the usage of diminishing resources. The tapering of the set also shows initial effects of limited corrective actions in the market place, but it reflects true market conditions. The narrowing of the set starts as limited resources tightens pressure in the resource-markets. This strategy may prolong economic life to last longer than before, but not as long as the best strategy.

The narrowing bounded set at (E1) reflects even more of the market imperfections and imperfection of democracies that stifle rights to ownership, to entrepreneurship, and to right to vote, or to test opinions (not about other rights, but about the market choices). Especially, it shows the wastefulness of diminishing resources. Examples for economic activities were ubiquitous up to the early part of the last millennium. Nevertheless, vivid examples of the late 1800s United Kingdoms' pollution after the steam engine led to extensive industrial production. Later in the United States, metal mining and steel production had the same impacts on the East Coast.

The general understanding assumes that it is very difficult to set conditions or systems to satisfy humanity in totality. However, satisfying the majority of the population such that ($x > y > z$), for example [80%>60%>40%], with harming the least in the reverse order seems to be the best condition we can assume at this time.

With free competitive markets, relative free trade, free mobility of capital and workers, and a rational currency exchange mechanism will do a lot to minimize harm, where rational beings may exchange their differences rather than engage in conflicts. Each failure, knowingly or otherwise, wastes resources, replaces functional systems, and reduce trust in any further attempts to correct fundamental shortcomings present or transferred to a new region. Alas, the horrendously poor circumstances and Dickensian inhuman conditions around Asia, Africa, South America (granted that positive examples like South Africa also exists) and elsewhere invites the need for ideas to improve level of living globally.

Simply going back to military models of previous millennia will prove to be the most destructive and mutually resource wasting of all options. Even employing the most constructive of the militarists' solution, the Marshal plan, with the old technologies, without selections among appropriate modern technologies can be very limiting. However, with appropriate global commitments to remedy mistakes and make proactive corrective fallback positions, the transfer of appropriate technologies, with related education, skills, and job creation will initiate a positive development plan. The sustainable development will resume, and much of current ills will very slowly dissipate, when production systems start on a constructive growth pass. There will be new problems and solution with the constructive process in place.

Figure 12 shows social utility functions and social welfare indifference curves related to bundle X and Y. The bounded set (E2), reflects correct selections of

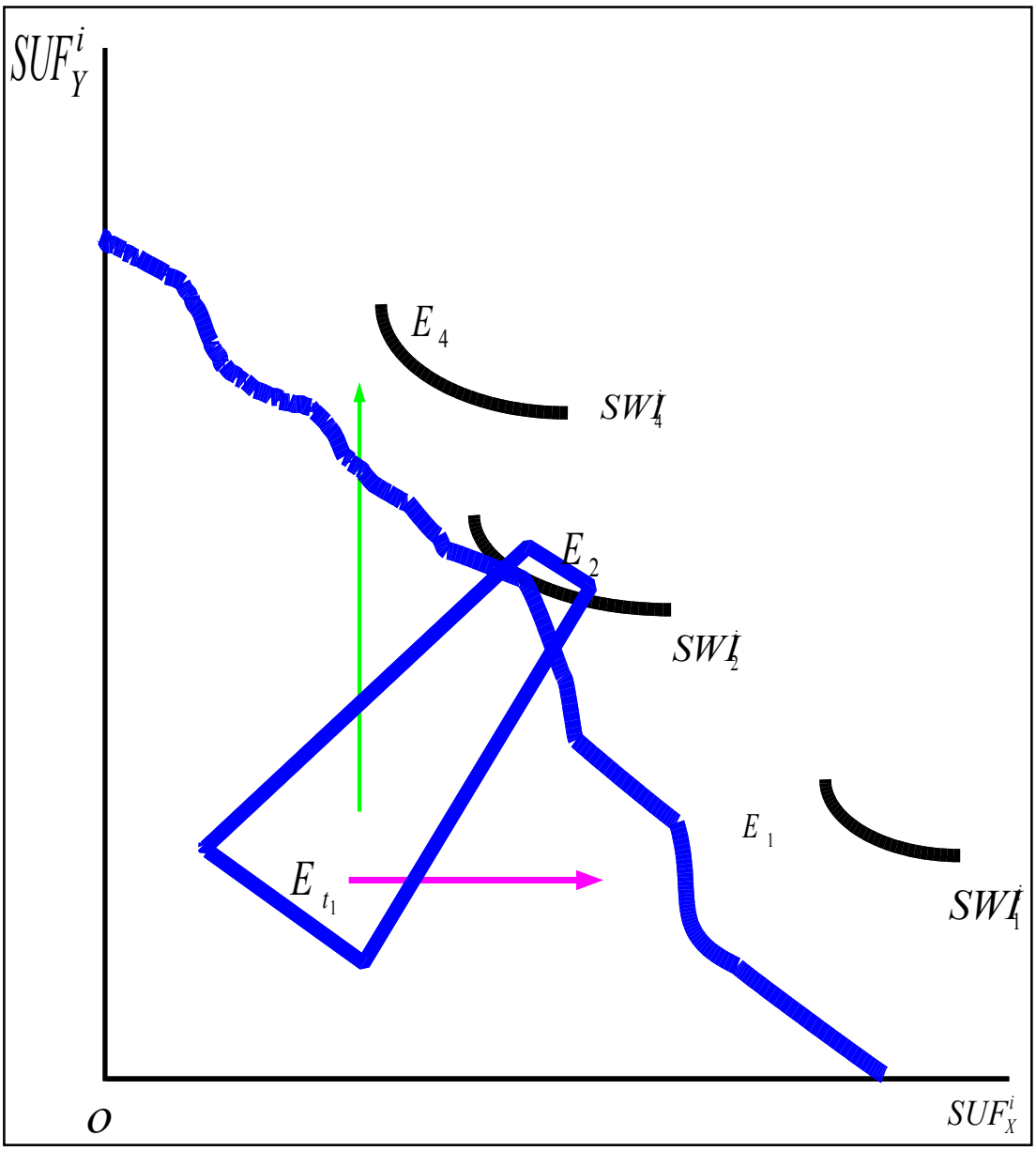

Figure 12. Dynamic social welfare utility and frontier of technologies.

technologies, and a constructive path, with reliance on integrated production and smaller, more efficient, and less polluting production units. Resources become more available as pricing reduces wasteful overproduction and consumption.

There are more resources but diminishing, they will be available in the future; thus, the narrowing set. The social welfare frontier level modifies to benefit from a better mix of X and Y. The increased population will still benefit from the improved arrangement here than from a less efficient, more imperfect system.

The indifference curves at the E4 level can present more goods, better services, and more expensive alternatives, but it uses up the resources much faster. The choices at E1 are less expensive, but leave a larger number of the community with a worse choice than they prefer. Therefore, they may have much less cooperation and do not reflect the majority of the community in the (Et1) set. Despite displeasures of some, the majority of market transactions have to be cooperative agreements and exchanges. Everyone participating in the marketplace wants to get more of something he or she does not have. They will give up something, if they have too much of that something. Both sides often should walk away thinking they have made an improvement over the moment before they walk into the deal.

Figure 12 shows dynamic social welfare utility and social welfare production frontiers of different technological solutions The optimum set of technologies will at (E2) present the most efficient uses of production process and put the consumers at (SWI1) the higher social welfare indifference curve possible. The social welfare frontier level and utility are higher than under Figure 11.

The true comprehension of science, sometimes comes with the dramatic drowning in the reality of scientific events, for some inexplicit reason remain hidden to most for uncertain periods. Figure 12 becomes clearer as we see differences in level of lives over long periods.

First-hand knowledge and life experiences are valued training in growing-up around the dualism of urban-rural life in a developing world in the 1960s. The technological advancements were slowly crawling their way into city lives. The rural lives within 20 miles would only see the same modernity but later, and at a much slower growth rate. The downside of development also left death-marks around as well. A more universally known example is the black toxic pollution clouds common to London industry in the 1800s, now classified as brown urban industry clouds globally.

The population of the world has exploded exponentially since scientist and economists introduced the Malthusian dilemma. What a wonderful point of historic time this is to study the Malthusian quandary and see that technological injections have produced waves of humanity past it. The varieties of industries have evolved to employ a far wider number of people. Another example was the public television attempt to take modern families out of the city and put them in rural life minus electrical and modern technologies. Experiencing the technological gap, one can readily see the converted bounded set of possibilities available to the present population, versus in the early 1900s or the 1800s. Therefore, given such technological possibilities exist, or are researched for the future, we can see it is not such a leap of academic judgment. In Figure 13, the bounded set (E4) presents such a scenario, where technological progress allows for more

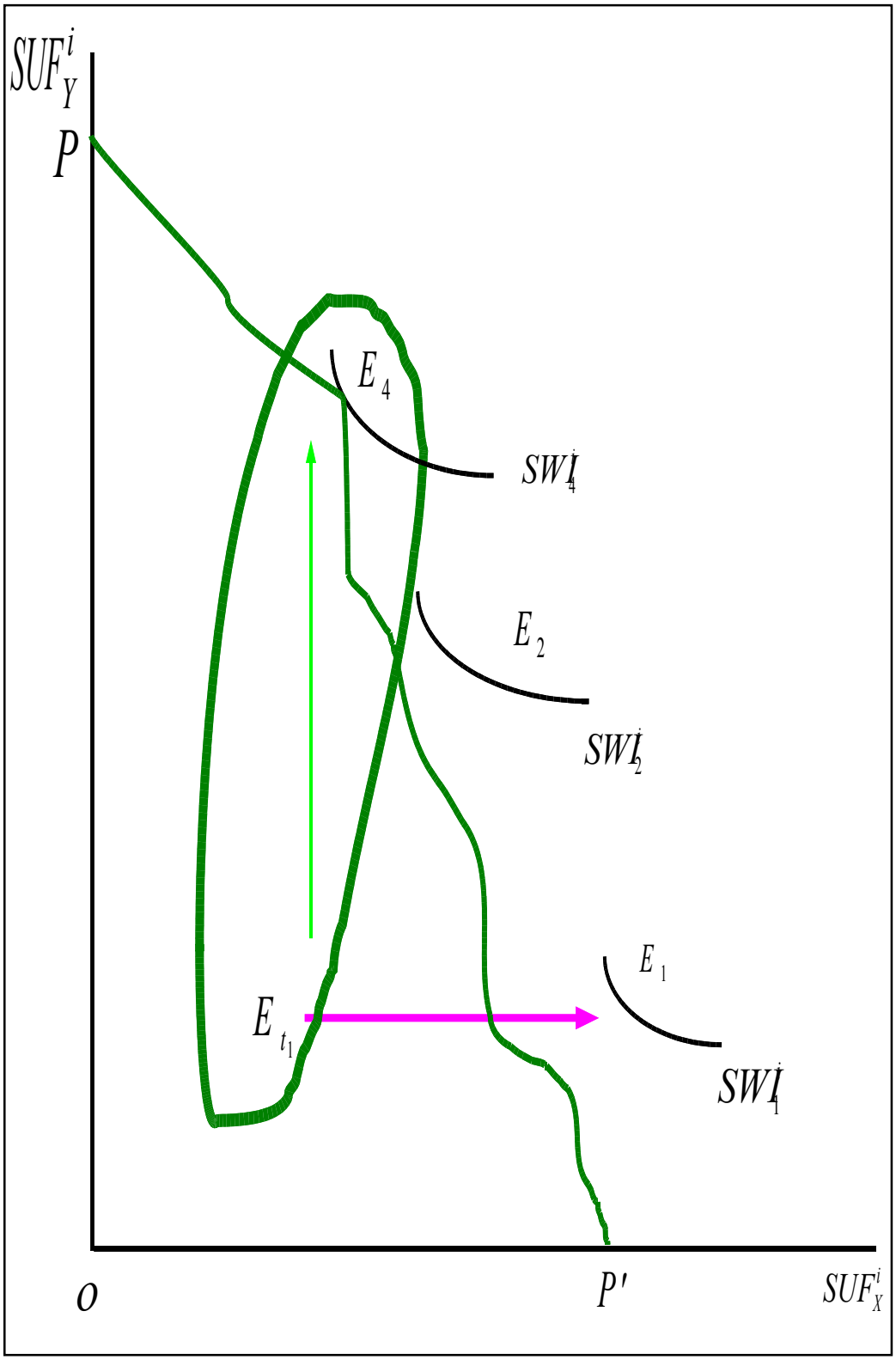

Figure 13. Dynamic social welfare utilities of different technological solutions.

population to live in global-wealth with much less waste-extensive and less energy-using methodologies. Figures 13, and 14 show the social welfare utility (SUF) set of different technologies, reflected in production possibility frontier (P P'). Growth and development in these economies will allow the economies to afford a more comfortable level of living, without limiting resources for the future.

The current population expansions require more innovative scholarship to find the sustainable development comfort zones. This will avoid future Malthusian conundrums to go unchallenged. This will reduce the instabilities associated with economic conditions associated with Malthusian conundrums, or worst. In Figure 14, the Pareto Optimum locus of individuals' satisfactions, at different levels (within the set), allows resources for different economic activities shown in the bounded set (Ft2). The three different technological production options are for different sets of technologies. These sets contain three different technological options used in an aggregate production of the global economy; the least favored option uses the most resources, produces large direct waste, and pollution as indirect waste, direct costs, and indirect costs related to pollution and social costs, which are ignored in the short-term accountings to fund the system[1]. An illustration would be the co-existence of an electronic software industry, next to a manufacturing production unit, next to a rural small farm region. Another complicated example would be an integrated auto-production, with tires made in Mexico, electronics in Japan, interior material in Iran, engine in USA, and the auto can be assembled in different regions like China, or Canada, or Europe. Some application exists, because without it, the

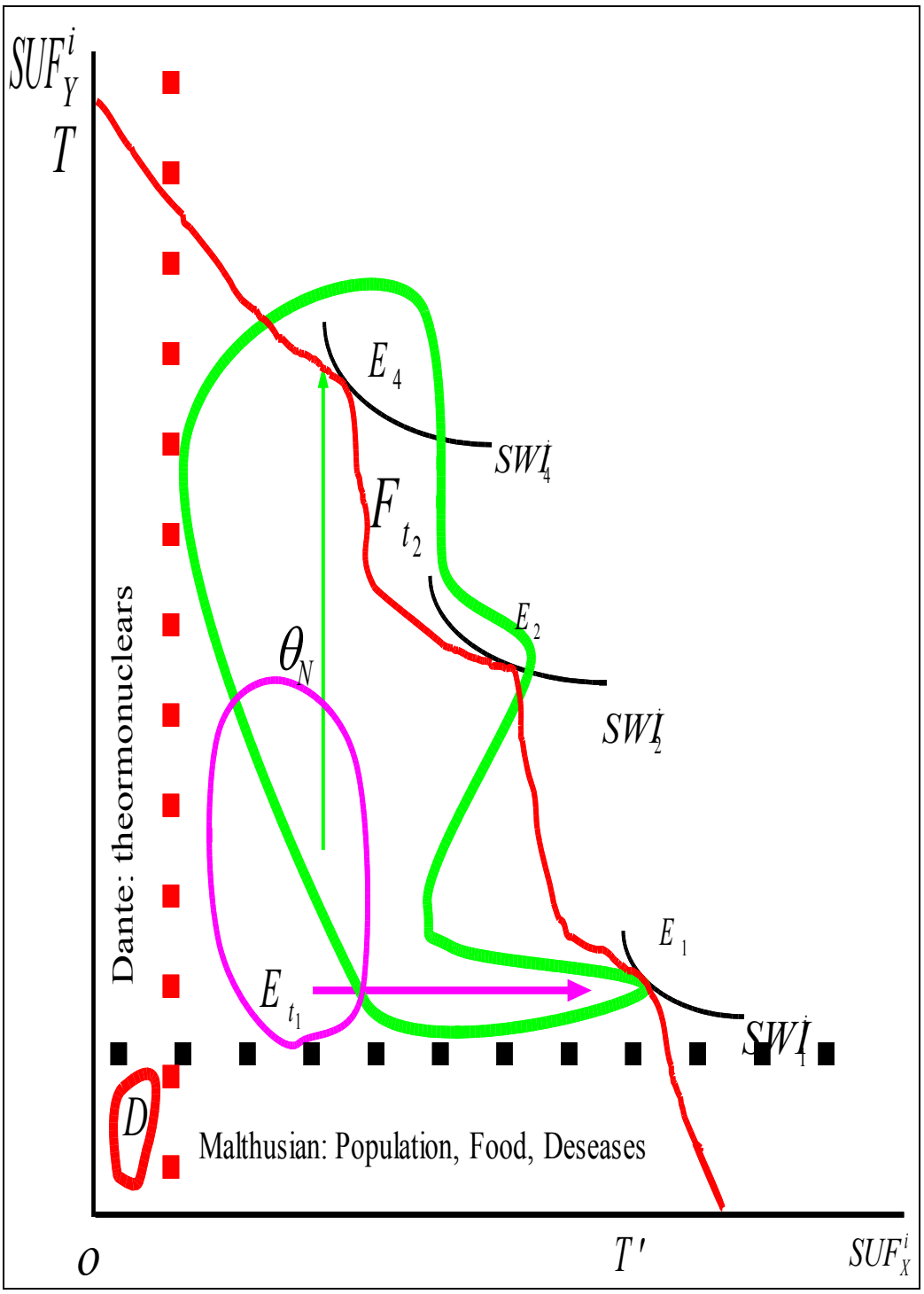

Figure 14. Dynamic social welfare utilities of different technological solutions.

current population could not be sustained, and there would be more global disaffection unemployment, famine, disease, and wars. As bad as it has been already, the news would be have been much worst. It is in neglecting the economic conditions that humanity invites more difficulties.

This model allows for biodiversity, cultural uniqueness, and production methodologies that encourage diverse production solutions to culturally distinct groups, with limitations regarding technological byproducts and waste, which are too lethal to biology around and in us. Figure 14 shows dynamic social welfare utilities of different technologies.

Therefore, a modern global economy integrated and diversified becomes possible that yields the economic welfare production frontier TT', and can meet the requirements of different indifference curves. This approach is preferred to the duplication of more constraining technologies for development. The following formulas show the maximum global Pareto Optimality in set theory.

The following set theory formulation states some of the assumptions involved in the graphs.[2]

$$F \neq \{\varnothing\}; F \approx \left\{\left\{E_1\right\} \cup \left\{E_2\right\} \cup \left\{E_4\right\}\right\}$$

$$F \neq \{\varnothing\}; F \approx \left\{\left\{E_1\right\} \cup \left\{E_2\right\} \cup \left\{E_4\right\}\right\}$$

$$\ni \left\{E_4\right\} \rangle \left\{E_2\right\} \rangle \left\{E_1\right\}$$

and

$$\{F_{t_2}\} \rangle \{E_{t_1}\}$$

The bounded set E4 includes more than the Pareto Optimum locus of individuals' satisfactions at different levels within the set, leaving resources for future economic activities. However, this requires less consumption-extensive level of living, and generally less market imperfections, and more true costs (externalities reflecting prices), than at other bounded sets. The bounded set does not narrow but either stays the same longer or expands over time, reflecting the intertemporal investments in appropriate technologies and increasing consumer Pareto Optimum and preferred satisfactions in the future by diversifications of resources and prolonging the usage of diminishing resources (by the maximization of set {F}). This also shows initial effects of limited corrective actions in the market place, but the reality, reflecting market true conditions and narrowing of the set, starts to show, as pressure on limited resources tightens.

The benefit of nonmilitary appropriate technological advancements will become clear (minimization of set {D}) subject to its constraints) when they make possible a production possibility frontier reflecting the new transformed economies (TT') allowing for adaptations, without triggering the fallacy of composition current models trigger. Most current models by duplicating advanced economies' discarded energy-use- intensive technologies will trigger very limiting options in the shorter run, the exponential increases in the brown industrial plumes, ozone problems, waste issues, nuclear wastes, water toxins, and fish kills, occurring in and around urban centers globally, are not facts for future.

There are actual hopeful signs. When skipping certain technologies, a generation for more efficient ones, like the wired phones for new digital-cell phones, or use

of propane instead of wood or coal or oil fuels is adopted readily in a larger segment of the global households, not knowing the extent of technologies in an actual advanced economy' households. In the rural centers, the uses of village stationed propane cookers shifts nonheating fuel (energy) uses substantially, away from wood burning and deforestation. However, introductions of cars and personal transformations will quickly push communities into the brown clouds.

The other wonderful modern technology of communication may yet have other surprises for us. For a long time, the world looked at the implosion of the Soviet system, not understanding how communication made comparative realities so forcefully unbearable. The world suddenly could vote by their eyes, legs, and opinions, a democracy without party system affiliations, and overt media manipulation and the expensive political sausage making that goes with it. We will revisit this phenomenon again in business cycles, capital concentration, income and wage package economic distortions, and human capital mobility globally, until we can grasp its true significance.

A realistic study of global economic conditions leaves very few choices away from constructive and cooperative endeavors, as nonpassive as it gets, toward minimization of conflicts for better cooperation for improved economic employment of resources, human and nonhuman capital, and shared functioning economies on shrinking productive soil. At times, when humanity is not on one of the many destructive side roads, we are optimistically closer to the true constructive path. Often between world wars, we find short periods, when constrictive strategies can help. Let us hope we get and stay on that path, before it is too late!

The Real World Solutions

It is clear that advanced economies despite their claims cannot deliver a dream life to more than 5 percent of their populations. Their middle class level of living and their numbers have been modified, and they have been shrinking over time. The last two decades of anti-immigrations rhetorical verbiage and laws have grown, however unconstructive and counterfactual these concerns have been in most advanced economies with shrinking worker-replacing aging populations, and most inadequately underfunded retraining and education systems. Unbalanced tax-subsidy policies and the lack of middle class job creation are more evidences. The hope for a functional lifestyle for a growing population depends on hopeful ways to study the resource uses of this millennium. It is also clearer that corruption of governance is not the source of all evils, but Enronism and market disconnects become dangerously implosive or worse dust devils in smaller economies. Despite the noise, in reality, larger economies are not immune against it either. Beyond health, education, defense, and regulatory duties, mostly private economic mechanisms and processes formulate future life, by designs of new and appropriate-nonmilitary technologies for best limited-resource uses and wealth creation. Is this possible for the level of life and diversities of lives, which would be accommodating to cultural diversities, without extensive conflict creations? For the most part, this increasingly falls on the smaller units of productions, while the larger units modify the laws in their own self-interest, under conditions harmful to the well-being of all. Increasingly, these smaller production units are immigrants as well as native risk takers.

Appropriate technologies, diversities, and getting on the right constructive

path accommodate our future life options so that they do not narrow or diminish but they expand. For example, in the more complex, advance, and integrated economies, Japan still serves as a good example of what massive pro-active transfer of appropriate technologies can achieve. One should note that Japan is very selective about how and what technologies they filter and transfer, and they pro-actively modify technologies for their evolving conditions. Even Japanese are aware that another 100 countries duplicated in their exact image will run out of demand and resources in short order. There are logically powerful tendencies for natural diversities in cultural tastes, demands, and tolerances globally, thus the logic of diversities in methodologies to supply them, duplicating or adopting the dynamic biodiversity models from nature for survival strategy.

The economic movements toward free trade in China serve as a good example to study the impact of limited baby steps to adopt relatively free market mechanisms. The march of democratization guardedly proceeds, in light of Russian experiences, and some Western relative democracies' cultivation of nondemocracies. The clear results will perhaps appear early in this millennium, as China meets the challenges of being the second global super power and economic cycles. If successful, given the size of their population, they will attract far more attention.

Smaller scales, uses of propane instead of other fuels, small village stations for cooking, and water pumps have already improved health conditions. Water containing and rechanneling in more drought regions have also shown good results. Modulated renewable energy-source development still uniquely contains the most ubiquitous global development potential. However, urban regions are the sources of polluting and need to be

an important part of the solution. They are where the unemployed population concentrates. Another reason is that computer-robotic automation unabated at the expenses of labor may prove to be more of a global disaster as well.

The global options are limited, they are not always all we desire, and they are not distributed justly or in egalitarian ways. However, with open markets mechanism, democracies (or relative democracies), and some added-infrastructures, the level of lives will improve in growing circles of humanity than present situations allow in large regions of Africa, Asia (including Eurasia), and South America.

However, it is intellectually insincere that advanced mixed economies and beneficiaries of Keynesian redistributions' theories become austere budgetary destructionists. They have sustainable supply and demand side equilibrium and balancing monetary and fiscal mechanisms. They become, self-prescribed Adam Smith capitalists' economists, on behalf of trans-global mega monopolists, even Adam Smith would not recognize. Unfortunately, the current degree of human miseries and ubiquity of global communications are such that we will share the humanities' fortune and misfortunes alike, wherever we are, and regardless of any moral ambiguities or theological complexities and differences. Too little knowledge can serve to be a dangerous thing. Either, we are fueling the flames that burn us all, or we are resolving our differences, and agree to grow the trees of lives and crops of heaven to feed us all.

The concept of national wealth building has expanded to a global concept of wealth building. Thoughtful selection of appropriate technologies accommodates sustainable strategies along the integration strategies to improve human conditions

globally. These would strategically complement creative distraction works by dynamic creative construction strategies and implementations. These would avoid the implications of economic failure and respond correctively to sustainable development.

Notes

[1] Bahman Fakhraie, "The Demand and Supply Sides of Appropriate Technological Advancement." (research paper at University of Utah Economics Dept., 2003)

[2] James Quirk and Rubin Saposnik, *Introduction to General Equilibrium Theory and Welfare Economics* (New York: McGraw-Hill, 1968), 19-27

CHAPTER 8

ECONOMETRIC STUDY OF DATA

The Econometrics of new capital measures and technological variables are presented in this chapter. In the following tables, some of the measurements are classified and presented together to study the impacts of the new measurement used for technology and capital in economic production. Tables 7 and Table 8 are generated out of the more recent data, and they further reinforce the hypotheses that technological advancements are a continuum part of the production process. The additional education parameter also reflects the positive contribution of education to production.

Table 7. Four decades of embodied technological advancement in current data

Av growth rate / Years	r gdp	r cst/h	r cs+/h	r ed/h	r y/h
1962-1972	0.34	0.34	0.90	0.25	5.37
1972-1982	0.45	0.56	2.01	0.59	10.73
1982-1992	0.66	0.75	3.31	1.13	22.31
1992-2002	1.05	1.34	5.09	1.84	33.81

Note: 1-Different measures of capital and rates of capital formation have been added.
2-A new measure for education per hours of educators have been added.
3-Increase of output per hour of work is also noted.

Table 8. The logarithmic linear regression of U.S. annual national account data.

Years 1950-	Capital Types	A	C/H	R^2	n	DF	F value	t	P
50 - 60	C	1.57	0.305	0.997	10	9	2,991	5.1	6.3E-04
	C’	1.53	0.307	0.998	10	9	4,491	10	2.6E-06
60 - 70	C	1.36	0.379	0.99	10	9	891	3.09	1.2E-02
	C’	1.05	0.464	0.994	10	9	1,491	5.7	2.9E-04
70 - 80	C	1.67	0.379	0.47	10	9	7.9>.05	1.3	0.20
	C’	0.68	0.53	0.94	10	9	141	4.7	1.05E-03
80 - 87	C	4.19	-0.32	0.11	7	6	0.74 *	0.32	0.70
	C’	0.18	0.65	0.97	7	6	194	3.8	8.6E-03
50 - 87	C	1.38	0.372	0.97	37	36	1,164	29.7	<10(-6)
	C’	1.30	0.385	0.99	37	36	3,564	42.11	<10(-6)

Notes: The gross private investments (Bils. 1982 dollars). The relation analyzed, is {O/H= f((C or C’)/H
Natural Logarithm of capital and Labor-Hours ratios.
n-sample size, k-DF, DF-Degree of Freedom
A-Intercept
C-Capital, C’-Adjusted Capital.
P-Probability

The application of Domar-Lohman-Ruchti adjustments to the capital measurements improves the correlation coefficients. The capital embodied technological parameters per each labor hour over time increases as the data under (C/H) show.

The same set of data is analyzed by multiple regressions. That is, the traditionally measured capital and adjusted capital are tested, before and after the application of Cochrane-Orcutt, Durban-Watson procedures. The refinement of data comes after iteration, which involves the following formula. The following equation is a filter formula. These are the Cochran-Orcutt and Durban Watson procedures equations.

$$X'_t = X_t - \rho X_{t-1}$$

$$\rho = \frac{2-DW}{2}$$

The same statistical analysis studies the new set of data, one with the traditional capital and the one with adjusted capital, labor hours being the same. Table 9 demonstrates this.

Table 9. The regression analysis of data with the traditional capital.

Ind. variables	int-cept	coeffi-cients	Std Err	T Value	P(T)	R^2	R^2 -adj	st err of est.	DW
Ln (K/H)	1.38	0.372	.12E-02	29.80	00	0.961	0.960	0.036	1.01

Multiple-regression Analysis of Variables for Technology Impacts

Important research further studies all relevant factors of production that have technological components for their potential impacts on production process. Those with optimum correlations advance to extensive testing as follows.[1]

The initial test run includes available viable data for an overall period, in this case, 1963 to 2004. Then for two subsequent decades, other tests are done, for the period of 1963-73, and the period of 1973-83.

The comparative evaluation will aid our understanding of the performance of our data and new variables. The iterations occur before the econometrics' tests applications.

These are the log-determined multiple-regressions results for technological modified and requested new parameters, and traditional and adjusted capital.

They have passed T-test and Chi square test, Correlation test, F-test, and R-Square tests. At 95 percent confidence level they are within the sample markers, the variables are independent from each other, and they are non-zero.

The data undergo DW iterations, and second run results (if required) take place. Alas, the results are constructively positive. Moreover, they back the hypothesis as stated in the original and present abstract. This set of variables represents the traditional estimation of capital stocks and the adjusted capital measures. In addition, set of data representing each capital stock, and adjusted capital stock are subject to the econometric analysis. Both sets will include a new variable, the educational parameter.

The Long Run Econometrics Study of

New Technological Parameters

Table 10 shows the newly re-estimated capital stock and related parameters for the 1963-2004 periods. The econometrics displayed here are the data after the second run Durban Watson adjustments.

Even to the noninitiated to econometrics, the significance of the finding resonates. The simple comparison of RTSn and RTSt reinforces the proof of the theses-statement, as indicated in abstract copy enclosed with the body of the dissertation.

Further analysis and evaluations of data again assist us in the understanding of these new parameters and their significance in our work. These are the log-determined multiple-regressions results for technological, modified, and requested new parameters.[2]

Table 10. Comparative analysis of multiple regression parameters.

a	0.28938	%	a’	0.13625	%
V1	0.00126	.01	V1	(0.0255)	(2)
V2	0.12334	12	V2	0.2681	23
V3	0.89979	87	V3	.89578	78
u	0.30948	-	U+	0.030743	-
RTSt	1.02340	-	RTSn	1.14021	-

Note: The control tag name for data is Ct2ndrun/ dstdfc32710.
The control tag name for data is CSs+2nd run/dstdfc32710.
Data is for 1963-04 traditional and adj. & new tech., parameters.

The following equations are the log linear econometrics of production functions and proof equations[3].

$$y = Ae^{a}c^{\beta}l^{\propto}k^{\vartheta}e^{u}$$

$$\ln y = lnA + alne + \beta lnc + \propto lnl + \vartheta lnk + ulne$$

$$\ln y = \sout{lnA}0 + \sout{alne}1 + \beta lnc + \propto lnl + \vartheta lnk + \sout{ulne}1$$

$$\ln y = a + \beta lnc + \propto lnl + \vartheta lnk + u$$

such that: RTSt=f (a, v1, v2, v3, v4)

and RTSn=f (a, v1, v2, v3, v4)

Proof: RTSn>RTSt

The data have passed correlation fitness tests, F-type, and R-square tests. Their R-square regression fitness tests are significantly high.

The variables explain over 90 percent of changes in the dependent variable. The Durban Watson iterations take place with their statistic.[4] Alas, the results are affirmative. Moreover, they back the hypothesis as we suspected all along.

These sets of variables represent the traditional estimation of capital stocks, the newer adjusted capital stocks, and the newly add educational parameter.

Even the new students of econometrics can comprehend the significance of the finding of the study. By comparing the parameters and variables over time, we will see trends that can help our understanding.

The simple comparison of RTSn and RTSt reinforces the proof of the thesis statement. That is, RTSn>RTSt.

Longer Run Econometrics of Traditional Capital

and New Parameters

Econometric analysis of data set [CT2nd run/dstdfc32710 (1963-04)] is detailed.

The multiple regression analysis of data presents the elasticity of parameters. The three independent variables include the new parameter for educational funding. They are calculated for traditional and adjusted capital.

Tables 11, show the more extensive data for 1964 to 2004. Table 12, 13, and 14, show more analysis for the same data.

Table 11. Regression tests results for (1964-2004).

SUMMARY OUTPUT					actu(Ps)	%(P/RTS)
			a	1.33561	0.28938769	
Regression Statistics			v1	1.00127	0.00126918	0.001
Multiple R	0.952923		v2	1.13013	0.12233484	0.12
R Square	0.908063		v3	2.4591	0.89979695	0.879
Adjusted R Squar	0.900805		u	1.03143	0.03094819	
Standard Error	0.030948		RTS=	4.59051	1.02340097	
Observations	42					
ANOVA						
	df	*SS*	*MS*	*F*	*Significance F*	
Regression	3	0.35948	0.11983	125.109	9.6994E-20	
Residual	38	0.0364	0.00096			
Total	41	0.39588				
	Regression for data Set [CT2; 32710 (1963-04)]					

Table 12.

Regression coefficents for 1964-2004 data.

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.2893877	0.307632379	0.94069	0.3528	-0.33338149	0.912157	-0.33338149	0.912156882
ct	0.0012692	0.00459224	0.27638	0.78376	-0.00802732	0.010566	-0.00802732	0.010565686
h	0.1223348	0.271857624	0.45	0.65527	-0.42801214	0.672682	-0.42801214	0.672681822
edmils	0.8997969	0.065684704	13.6987	2.8E-16	0.76682522	1.032769	0.76682522	1.032768679

T-test for data Set [CT2; 32710 (1963-04)]

Table 13. Chi square test result for (1964-2004).

RESIDUAL OUTPUT			
Observation	*Predicted y$*	*Residuals*	
1	1.501320825	-0.018027188	4.903676
2	1.446246508	0.079034221	5.188161
3	1.543310326	-0.029101239	4.758695
4	1.536450143	0.001939913	4.811114
5	1.603543844	-0.04862514	4.559329
6	1.601354596	-0.026677648	4.587576
7	1.571304548	-0.022525515	4.679972
8	1.624527463	-0.036082251	4.512352
9	1.615709976	-0.027587121	4.545669
10	1.639128115	-0.067831957	4.440087
11	1.636424552	-0.030692282	4.484674
12	1.601219346	0.0257396	4.640383
13	1.627847437	0.025668704	4.564826
14	1.700958139	-0.064180787	4.279874
15	1.673814419	-0.021313085	4.393188
16	1.64510073	0.036993172	4.528546
17	1.665718012	0.026914716	4.462873
18	1.668315615	0.051446313	4.480498
19	1.711396992	0.010368777	4.327927
20	1.692177157	0.015638385	4.382236
21	1.687003143	0.060207202	4.440197
22	1.697284307	-0.012450176	4.341008
23	1.708899962	0.023629163	4.347496
24	1.732084753	0.032832014	4.298822
25	1.742896408	-0.002097508	4.237429
26	1.736223028	-0.002257027	4.253565
27	1.739936285	0.00446055	4.2512
28	1.757538205	0.007374153	4.211582
29	1.767983512	0.002943377	4.182313
30	1.764357445	-0.000956877	4.187002
31	1.752786729	-0.006973775	4.208631
32	1.764729945	0.00743459	4.194509
33	1.747849996	0.024186009	4.251698
34	1.784854922	0.003824019	4.143688
35	1.779727155	0.000155419	4.151947
36	1.779495258	0.015458424	4.167791
37	1.806962752	-0.000579508	4.088634
38	1.811995792	-0.007507219	4.070348
39	1.819833356	-0.003669028	4.056624
40	1.828446886	-0.006308729	4.034857
41	1.815666405	-0.013519242	4.056092
42	1.814846961	-0.00728542	4.064163
X^2 pass			183.7713

Table 14.

DW test results for 1964-2004 data

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.951[a]	.904	.896	3.157E-02	.904	119.299	3	38	.000	1.671

a. Predictors: (Constant), V2,V3,V4
b.Dependent Variable: V1
c.Data Set [CT 2nd run/dstdfc32710(1993-04)]

The Table 13 Chi square test (Ct2ndrun1963-2004 data se) shows with 95 percent confidence the variables are independent of each other. X^2c > X^2t => H0, hypothesis H0, (Vi are independent of each other) is accepted. Hypothesis H1 (Vi are not independent) is rejected. This holds for (i= 1, 2, 3). Table 14 shows the Durban Watson autocorrelation test for the data.

Long Run Econometrics Analysis for Data Set

Table 15 shows the econometrics analysis associated with data [CS+2nd run/dstdfc32710 (1963-04)]. In addition, Table 16 shows the Chi square test result for the same data. Table 17 shows the Durban Watson test.

Table 15. Regression tests results for (1964-2004).

SUMMARY OUTPUT					
			a	0.136254	
Regression Statistics			v1	-0.0255	
Multiple R	0.953561		v2	0.268131	
R Square	0.909279		v3	0.897585	
Adjusted R S	0.902117		u	0.030743	
Standard Er	0.030743		RTS=	1.140215	
Observations	42				
ANOVA					
	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	0.359965	0.119988	126.9561	7.53526E-20
Residual	38	0.0359144	0.000945		
Total	41	0.3958794			
	Regression analysis of data set CS+2 (1963-2004).				

Table 16. Chi square test for data set (1964-2004)

RESIDUAL OUTPUT			
Observation	*Predicted y$*	*Residuals*	
1	1.501320825	-0.018027188	4.903676
2	1.446246508	0.079034221	5.188161
3	1.543310326	-0.029101239	4.758695
4	1.536450143	0.001939913	4.811114
5	1.603543844	-0.04862514	4.559329
6	1.601354596	-0.026677648	4.587576
7	1.571304548	-0.022525515	4.679972
8	1.624527463	-0.036082251	4.512352
9	1.615709976	-0.027587121	4.545669
10	1.639128115	-0.067831957	4.440087
11	1.636424552	-0.030692282	4.484674
12	1.601219346	0.0257396	4.640383
13	1.627847437	0.025668704	4.564826
14	1.700958139	-0.064180787	4.279874
15	1.673814419	-0.021313085	4.393188
16	1.64510073	0.036993172	4.528546
17	1.665718012	0.026914716	4.462873
18	1.668315615	0.051446313	4.480498
19	1.711396992	0.010368777	4.327927
20	1.692177157	0.015638385	4.382236
21	1.687003143	0.060207202	4.440197
22	1.697284307	-0.012450176	4.341008
23	1.708899962	0.023629163	4.347496
24	1.732084753	0.032832014	4.298822
25	1.742896408	-0.002097508	4.237429
26	1.736223028	-0.002257027	4.253565
27	1.739936285	0.00446055	4.2512
28	1.757538205	0.007374153	4.211582
29	1.767983512	0.002943377	4.182313
30	1.764357445	-0.000956877	4.187002
31	1.752786729	-0.006973775	4.208631
32	1.764729945	0.00743459	4.194509
33	1.747849996	0.024186009	4.251698
34	1.784854922	0.003824019	4.143688
35	1.779727155	0.000155419	4.151947
36	1.779495258	0.015458424	4.167791
37	1.806962752	-0.000579508	4.088634
38	1.811995792	-0.007507219	4.070348
39	1.819833356	-0.003669028	4.056624
40	1.828446886	-0.006308729	4.034857
41	1.815666405	-0.013519242	4.056092
42	1.814846961	-0.00728542	4.064163
X^2 pass			183.7713

Table 17

DW result after the second test run (1964-2004)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.951[a]	.905	.897	3.145E-02	.905	120.311	3	38	.000	1.709

a. Predictors: (Constant), V2,V3,V4,
b.Dependent Variable:V1
c.Durban Watson test for CS+2nd run/dstdfc32710

Table 16 shows a Chi square test with 95 percent confidence that all variables are independent of each other. $X^2c > X^t \Rightarrow H0$, that is the hypothesis H0 (Vi are independent of each others) is accepted, for (i= 1, 2, 3). Table 17 shows the DW test.

Comparative Graphic Proof

In Table 18, there is the comparative study of the technological parameter of traditional and adjusted capitals. The adjusted capital parameters show a distinct econometric improvement over the selected time span. The indicators as summation of technological parameters with adjusted capital exceed the indicators calculated using traditional capital for the same period. Since the calculations include the new technological parameters, this will be further proof that these are important variables to monitor and maintain for sustainable economic advancements. Figure 15 shows the new parameters, including traditional capital and adjusted capital over the extended periods. This will serve as the proof of our thesis in a longer period. The adjustments have improved the slope and the results are significantly positive for this period and the data.

Table 18. Technological parameters for two data set.

		1963-04 ct	1963-04 cs+
a		0.289388	0.136254
v1		0.001269	-0.0255
v2		0.122335	0.268131
v3		0.899797	0.897585
RTSt,	RTScs+	1.023401	1.140215

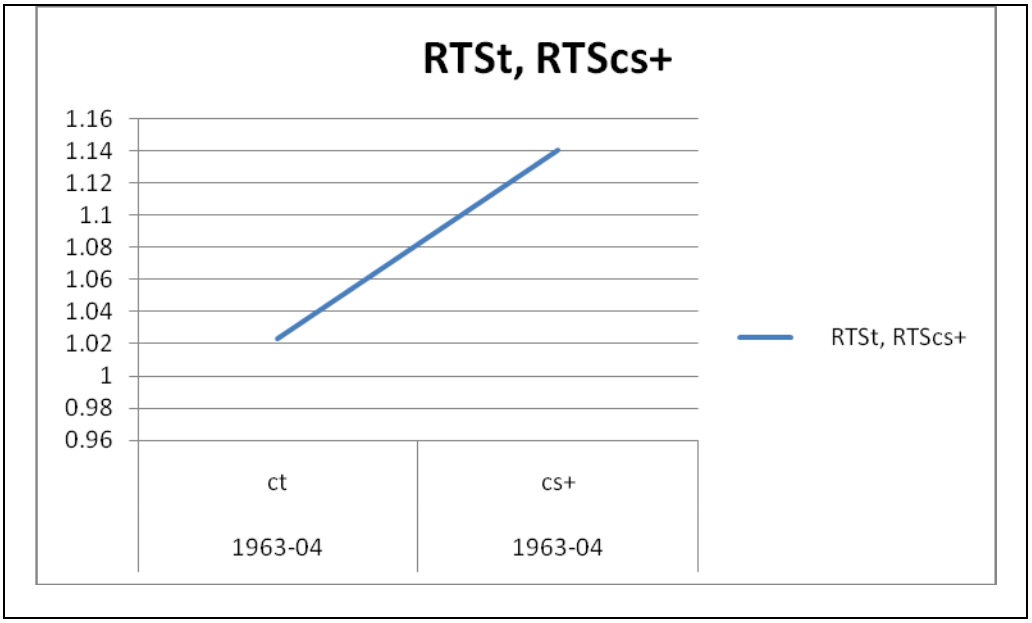

Figure 15. Comparative graph of data set from [dstdfnc32710.xl].

The graph is sloping upward. The policy implication is remaining solid. That is, investing a dollar in investment choices returning 80 cents remains preferred to the set of the economic stimulus project, which returns 2 cents, or 20 cents. In a balance approach, one could balance out by investing more in the first set of investment with the higher retune, if it is necessary to invest in the second two sets, for lower returns. That is, return from technologies associated with adjusted capital stocks will be more positive.

More Econometric Data Analysis

Further studies of the statistical analysis help evaluations of the data and result. The data are broken into subsets of ten years covering the span of time from 1960 to 1980, with the two sets of calculated capital stocks and contributions of variables to the overall process calculated over time.

The Econometrics Analysis for 1963-73 Data Sets

The result of econometric evaluations are presented in the following few presentations. The T-test, Chi square test, and F-test, R-square tests affirmed the hypothesis to accept the results, and if the Durban-Watson test had shown strong tendency for autocorrelations, further test had been done to bring the data in compliance for better results. The first set of data studies is the traditionally calculated capital measure and the new technological parameter. The second set of data is post-Domar iteration, and then the new capital measure and the new technological parameters are estimated. Table 19 shows the data set (1a, Ct, 1963 to 1973) for traditional capital.

Table 19. Econometrics data set for (1963-1973).

Years	y$	ct	h	Ed,k
	v1	v2	v3	v4
1963.	13.21	10.37	11.74	10.08
1964.	13.28	10.51	11.76	10.07
1965.	13.33	10.87	11.79	10.18
1966.	13.41	10.95	11.83	10.26
1967.	13.49	10.33	11.84	10.41
1968.	13.58	10.75	11.86	10.54
1969.	13.63	10.93	11.89	10.63
1970.	13.72	10.13	11.88	10.76
1971.	13.80	11.10	11.88	10.87
1972.	13.85	11.35	11.91	10.99
1973.	13.94	11.47	11.95	11.09

Table 20 shows regression tests results for 1963-1973 data. Data are using traditional capital measure and new parameters to study the econometric results. The high R-square and adjusted R-square are strong indicators that, with 95 percent certainty, the variables explain up to 99 percent of dependent variable.

Subsequently, Tables 21, 22, and 23 show further econometrics testing of the same data.

Table 20. Regression tests results for (1963-1973).

SUMMARY OUTPUT					actu(Ps)	%(P/RTS)
			a		1.29989	
Regression Statistics			v1		0.00080	0.000724984
Multiple R	0.99734		v2		0.52095	0.47389531
R Square	0.99469		v3		0.57754	0.525379706
Adjusted I	0.99242		u		0.02129	
Standard I	0.02129		RTSt=		1.09928	
Observati	11					
ANOVA						
	df	*SS*	*MS*	*F*	*gnificance F*	
Regressio	3	0.59489	0.1983	437	2.5E-08	
Residual	7	0.00317	0.00045			
Total	10	0.59806				
	Regression for data Set (1a,Ct, 1963 to 1973)					

Table 21.

Regression coefficients for 1964-2004 data.

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.2893877	0.307632379	0.94069	0.3528	-0.33338149	0.912157	-0.33338149	0.912156882
ct	0.0012692	0.00459224	0.27638	0.78376	-0.00802732	0.010566	-0.00802732	0.010565686
h	0.1223348	0.271857624	0.45	0.65527	-0.42801214	0.672682	-0.42801214	0.672681822
edmils	0.8997969	0.065684704	13.6987	2.8E-16	0.76682522	1.032769	0.76682522	1.032768679

T-test for data Set [CT2; 32710 (1963-04)]

Table 22. The Chi square test for (1963-1973).

RESIDUAL OUTPUT

Observation	*Predicted v1*	*Residuals*	
1	13.24519312	-0.037202652	0.55506
2	13.25202093	0.028371312	0.55972
3	13.33212727	0.001630908	0.55435
4	13.39998137	0.005453472	0.55183
5	13.48782326	-0.002067555	0.54768
6	13.57687075	0.000128783	0.54425
7	13.63876626	-0.006457642	0.5413
8	13.71026425	0.01093563	0.53974
9	13.7779614	0.022029343	0.53789
10	13.86558257	-0.012294644	0.53202
11	13.94568548	-0.010526955	0.52909
			5.99293

Chi Square at 95 percent confidence level; and df (3-0-1) presented.

$X^2c > X^2t$

Therefore,

H0, (Vi are independent of each other) is accepted

and

H1, is rejected.

for (i= 1, 2, 3)

The Durbin-Watson test is often to control autocorrelation in large data for time series analysis for economic data. $1.40 > DW > 2.40$ is used as an estimation that positive autocorrelation meets the tolerant level. This filtration of data assures that second tests correct problem data variables and outliers.

Table 23.

Durban-Watson test results for 1963-1973

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.997[a]	.995	.993	2.112E-02	.995	444.193	3	7	.000	2.482

a. Predictors: V1, V2, V3.
b. Dependent: V1.
c. Data period. 1963-1973.

The new DW=2.47 is within the tolerance level and the hypothesis pass for a' data set. The table shows a 95 percent confidence level for n=11 and k=3 is estimated at dl=.58 to du=2.56. Therefore, both sets of data pass the null hypotheses that for the v2, v3, v4, there are no positive autocorrelation. That is, H0 passes, and H1 fails. The hypotheses are defined as: H0 = There is no auto correlation, H1 = There is positive autocorrelation.

The Econometrics Analysis for Adjusted Capital

This is the econometric analysis of the adjusted capital and traditional capital and the new technological variables adopted and tested.

Table 24 shows the data set for adjusted capital and new technological parameters [1b, Cs+2, (1963 to 1973)]. Tables 25, 26, and 27 will further study the econometrics implication of data.

Table 24. Econometrics data set for (1963-1973).

years	y$	cs2+	h	Ed,k
years	v1	v2'	v3	v4
1963.	13.21	11.33	11.74	10.08
1964.	13.28	11.41	11.76	10.07
1965.	13.33	11.60	11.79	10.18
1966.	13.41	11.69	11.83	10.26
1967.	13.49	11.51	11.84	10.41
1968.	13.58	11.72	11.86	10.54
1969.	13.63	11.84	11.89	10.63
1970.	13.72	11.69	11.88	10.76
1971.	13.80	12.05	11.88	10.87
1972.	13.85	12.18	11.91	10.99
1973.	13.94	12.29	11.95	11.09

Table 25. The regression test for adjusted capital and 1963-73.

SUMMARY OUTPUT					actu(Ps)	%(P/RTS)
			a		1.474217711	
Regression Statistics			v1		0.017517131	0.0161653
Multiple R	0.9973763		v2		0.497742601	0.4593309
R Square	0.9947594		v3		0.568365624	0.5245038
Adjusted R Sqı	0.9925134		u		0.02115999	
Standard Error	0.02116		RTSc2s+=		1.083625356	
Observations	11					
ANOVA						
	df	*SS*	*MS*	*F*	*Significance F*	
Regression	3	0.594930259	0.1983	442.908	2.42085E-08	
Residual	7	0.003134216	0.0004			
Total	10	0.598064475				
	Regression for data set 1b, Cs+2, (1963 to 1973)					

Table 26.

Regression coefficient for adjusted capital and new parameters, 1963-73 data.

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	1.4742177	3.488590808	0.4226	0.6853	-6.77499	9.7234241	-6.7749887	9.72342414
v2'	0.0175171	0.058034983	0.3018	0.7715	-0.11971	0.1547481	-0.1197138	0.15474806
v3	0.4977426	0.350517248	1.42	0.1986	-0.3311	1.3265842	-0.331099	1.32658419
v4	0.5683656	0.06758295	8.4099	7E-05	0.40856	0.7281739	0.40855734	0.72817391

T-test for 1963-1973 dat.

Table 27. Chi square test for C' and new parameter data (1963-73).

RESIDUAL OUTPUT

Observation	*Predicted v1*	*Residuals*	
1	13.24519	-0.03720265	0.55506
2	13.25202	0.028371312	0.55972
3	13.33213	0.001630908	0.55435
4	13.39998	0.005453472	0.55183
5	13.48782	-0.00206755	0.54768
6	13.57687	0.000128783	0.54425
7	13.63877	-0.00645764	0.5413
8	13.71026	0.01093563	0.53974
9	13.77796	0.022029343	0.53789
10	13.86558	-0.01229464	0.53202
11	13.94569	-0.01052696	0.52909
			5.99293

H0: Vi are independent of each other ~ is accepted

The table shows 95 percent confidence level for n=11 and k=3, Durban Watson estimations are at dl=.58 to du=2.56. Both sets of data pass the null hypotheses that for the v2, v3, v4, there are no positive autocorrelations. H0 passes and H1 fails.

H0 = There is no auto correlation, (For V1, V2, and V3 > 0).

The Econometrics Analysis for 1973-83 Data Sets

The first data set reflects the traditionally calculated capital and new parameter; the second data set has the adjusted capital and new technological parameter. These sets of data undergo the same vigorous exhaustive econometric analysis and tests.

In addition, the second set of data includes the Domar iteration in adjusted capital measure and the new technological parameters.

The statistical F-Tests of significant in both models for 5 percent and 1 percent levels and 3 degrees of freedom from the model are affirmative. That is at a higher than 95 percent confidence level, such that Fc > Ft; therefore, we reject the null hypothesis H0: Vi = 0, and accept the hypothesis that H1: Vi ≠ 0.

In both sets of data, the estimated data parameters are not equal to zero, and all our variables are significantly deterministic in both formulations. These are different and additional presentation to the proof of the hypotheses required for each variable of the statistical analysis, presented in the R-square, T, and F-test.

It is important for the selection of multiple regression analysis that autocorrelation be also tested for. Because of the complexity involved and the nature of the economic variable, the bound-test of Durban Watson test was analyzed. In most cases, a calculated Durban Watson index close to 2 is sufficient to accept the hypothesis that ρ is equal to zero. For DW> du; accept the hypothesis that no significant level of autocorrelations exists or $\rho = 0$. That is, to meet the condition $d \approx 2(1- \rho)$. It is important to understand this is not an absolute equality, but a statistical approximation. These also become more significant and deterministic the smaller the R-square and adjusted R-square are in the same set of data. That is, at an adjusted R-square less than 80 percent or a big divergence between R-square and adjusted R-square, these other calculations gain much more importance. The graphic and the conclusion of the results are herewith also presented, in the support of the dissertational presentation to further prove this point of

impact of technological parameters and the affirmative impacts of the new measurements in the process of production. A new and innovative expansion of traditional measurements is specifically innovated in this economic study.

Econometrics for Traditional Capital (1973-1983)

The first set of data studies the traditionally calculated capital measure and the new technological parameters. The Domar iteration measures the adjusted capital measure for the new technological parameters' calculations. Table 28 shows data set [2a, Ct, (1973 to 1983)]. This is using traditional capital measure to estimate the new technological parameters. Table 29 shows the result of multiple regressions for the econometric study of the technological variables, in Table 30, coefficient analysis for data is presented, and Table 31 shows Chi square test results.

Table 28 . Econometrics Data Set for (1973-1983).

years	y$	ct	h	Ed,k
	v1	v2	v3	v4
1973.	13.94	11.47	11.95	11.09
1974.	14.03	10.63	11.96	11.15
1975.	14.14	10.63	11.93	11.24
1976.	14.22	11.50	11.96	11.38
1977.	14.31	11.82	11.99	11.48
1978.	14.42	12.08	12.04	11.54
1979.	14.52	11.99	12.06	11.62
1980.	14.65	10.39	12.06	11.69
1981.	14.76	12.21	12.06	11.80
1982.	14.84	7.17	12.03	11.89
1983.	14.96	11.61	12.04	11.95

Table 29. The regression test results for (1973-1983).

					actu(Ps)	%(P/RTS)
SUMMARY OUTPUT			a	2.58823	0.95097576	
Regression Statistics			v1	0.99523	-0.00478156	-0.0041
Multiple R	0.994258		v2	1.02267	0.02242064	0.01919
R Square	0.988548		v3	3.16008	1.15059775	0.9849
Adjusted I	0.98364		u	1.04445	0.04349478	
Standard I	0.043495		RTS=	5.17799	1.16823683	
Observati	11					b
ANOVA						
	df	*SS*	*MS*	*F*	*Significance F*	
Regressio	3	1.14313053	0.38104	201.419	3.7251E-07	
Residual	7	0.01324257	0.00189			
Total	10	1.1563731				
Regression ofdata set 2a, Ct, (1973 to 1983)						

Table 30.

Regresion coefficients for data set (1973-1983)

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	1.299887865	3.514193312	0.369897	0.722397	-7.009859	9.60963459	-7.009858863	9.609634594
v2	0.000796963	0.019832573	0.040185	0.969068	-0.0461	0.04769355	-0.046099621	0.047693547
v3	0.520945561	0.350034852	1.488268	0.180284	-0.306755	1.34864646	-0.306755338	1.348646459
v4	0.577541536	0.060705054	9.513896	2.97E-05	0.433997	0.72108618	0.433996895	0.721086178

T-tests of data set 2a, Ct, (1973 to 1983)

Table 31. The Chi square test results for (1973-1983).

RESIDUAL OUTPUT

Observation	*Predicted v1*	*Residuals*	
1	13.92956	0.005597	1320.278
2	13.9999	0.02935	251.7578
3	14.09608	0.043468	169.9898
4	14.26197	-0.041	-180.234
5	14.37758	-0.06841	-108.007
6	14.44138	-0.02413	-306.258
7	14.52842	-0.00443	-1668.97
8	14.62288	0.023229	318.0985
9	14.73981	0.016993	434.8275
10	14.86694	-0.02557	-289
11	14.91114	0.044895	164.5835
			107.0656

Since x^2c >X^2t, therefore, H0 is accepted and H1 is rejected. Hypothesis H0 is defined as (Vi are independent of each other). H1 is that Vi are not independent of each other, these relation will hold for i= 1, 2, 3.

The Durbin-Watson test is often to control autocorrelation in large data for longer time spans, and for time series analysis for economic data. (1.40>DW>2.40) are used as limits within positive autocorrelation meets the tolerant level.

It also serves as a filter to make sure all problem data and outliers are tested. In the following first run, we noted DW at 1.38 can pass but it is close to the borderline tolerance level.

However, we note that r-square, and adjusted r-square are at .98 and .99 level. Chi square test and F-test also are good.

Econometrics for Adjusted Capital (1973-1983)

This is the econometric analysis of the new capital measure and new technological parameters adapted and tested. Table 32 shows the data set [2b, Cs+2, (1973 to 1983)]. Table 33 shows regression test statistics. Table 34 presents regression coefficients for data. Table 35 show Chi square test. Since, X2c>X2t, this means hypothesis H0, is defined as Vi are independent of each other, is accepted. Hypothesis H1, defines Vi, dependent on each other, is rejected. These hypotheses hold for all variables, (i = 1, 2, 3).

Table 36 shows a 95 percent confidence level for n=11 and k=3; Durban-Watson limits are at (dl=.58 to du=2.56). Therefore, both sets of data pass the null hypotheses that for all variables, there are no positive autocorrelations. Hence, hypothesis H0 (There is no auto correlation) passes and H1 fails.

Table 32. Econometrics data set for (1973-1983).

years	y$	cs2+	h	Ed,k
years	v1	v2'	v3	v4
1973.	13.94	12.29	11.95	11.09
1974.	14.03	12.24	11.96	11.15
1975.	14.14	12.16	11.93	11.24
1976.	14.22	12.58	11.96	11.38
1977.	14.31	12.80	11.99	11.48
1978.	14.42	12.93	12.04	11.54
1979.	14.52	12.98	12.06	11.62
1980.	14.65	12.74	12.06	11.69
1981.	14.76	13.05	12.06	11.80
1982.	14.84	12.66	12.03	11.89
1983.	14.96	12.99	12.04	11.95

Table 33. The Regression test results for (1973-1983).

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SUMMARY OUTPUT					actu(Ps)	%(P/RTS)
			a		-5.9418	
Regression Statistics			v1		-0.1726	-0.0984
Multiple R	0.996634		v2		0.71822	0.40936
R Square	0.99328		v3		1.20885	0.68901
Adjusted R Square	0.9904		u		0.03332	
Standard Error	0.033318		RTS=		1.75448	
Observations	11					
ANOVA						
	df	*SS*	*MS*	*F*	*gnificance F*	
Regression	3	1.1486	0.38287	344.903	5.8E-08	
Residual	7	0.00777	0.00111			
Total	10	1.15637				

Tablel 34.

Regresion coeficients for data set (1973-1983).

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-5.941846393	5.338428586	-1.11303	0.30245	-18.5652	6.6815313	-18.5652241	6.6815313
v2'	-0.17258226	0.075281794	-2.29248	0.055604	-0.3506	0.0054309	-0.35059541	0.0054309
v3	0.718215536	0.526357808	1.364501	0.214652	-0.52642	1.962854	-0.5264229	1.96285397
v4	1.208850708	0.069504076	17.39252	5.11E-07	1.0445	1.3732017	1.044499685	1.37320173

T-test for data set 2b, Cs+2, (1973 to 1983)

Table 35. The Chi square test results for (1973-1983).

RESIDUAL OUTPUT

Observation	*Predicted v1*	*Residuals*	
1	13.93526	-9.7E-05	76282.37
2	14.0164	0.012848	-575.118
3	14.1113	0.028249	-261.568
4	14.2392	-0.01823	405.393
5	14.34595	-0.03678	200.8989
6	14.42265	-0.00539	1370.283
7	14.52313	0.000864	-8556.71
8	14.65231	-0.0062	1192.361
9	14.73518	0.021624	-341.699
10	14.88768	-0.04631	159.5595
11	14.90662	0.049417	-149.524
			69726.24

Table 36. Durban Watson result for data set (1973-1983).

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.997[a]	.994	.991	3.268E-02	.994	358.853	3	7	.000	2.368

a. Predictors: (Constant), VAR00004, VAR00002, VAR00003

b. Dependent Variable: VAR00001

More Comparative Econometric Analysis and Graphic Proof

The graphic and the conclusion of the results are herewith also presented, in support of the dissertational presentation to further prove this point of impact of the technological parameters and the affirmative impacts of the new measurements in the process of production.

Table 37 shows the graphic presentation of the comparative study. Parameters are studied for Traditional capital stock (cst), and adjusted capital stock (cs+), for two periods (1963-1973, and 1973-1983).

This is a new and innovative expansion of traditional measurements, specifically studied by Mr.Bahman Fakhraie in this economic study and this dissertation. Positive slope indicates the increasing return per expenditures in each area. The relative difference in the slope also is indicative to the large returns from the investments in adjusted capital and related technological parameters. Figure 16 shows the graph of two capital measures and technological parameters.

Table 37. Comparative technological parameters of four data sets.

periods	1963-73	1973-83	1963-73	1973-83
data	cst	cst	cs+	cs+
a	1.299888	0.95098	1.474218	-5.94185
v1	0.000797	-0.00478	0.017517	-0.17258
v2	0.520946	0.02242	0.497743	0.718216
v3	0.577542	1.15060	0.568366	1.208851
RTScst,cs+	1.099284	1.168237	1.083625	1.754484

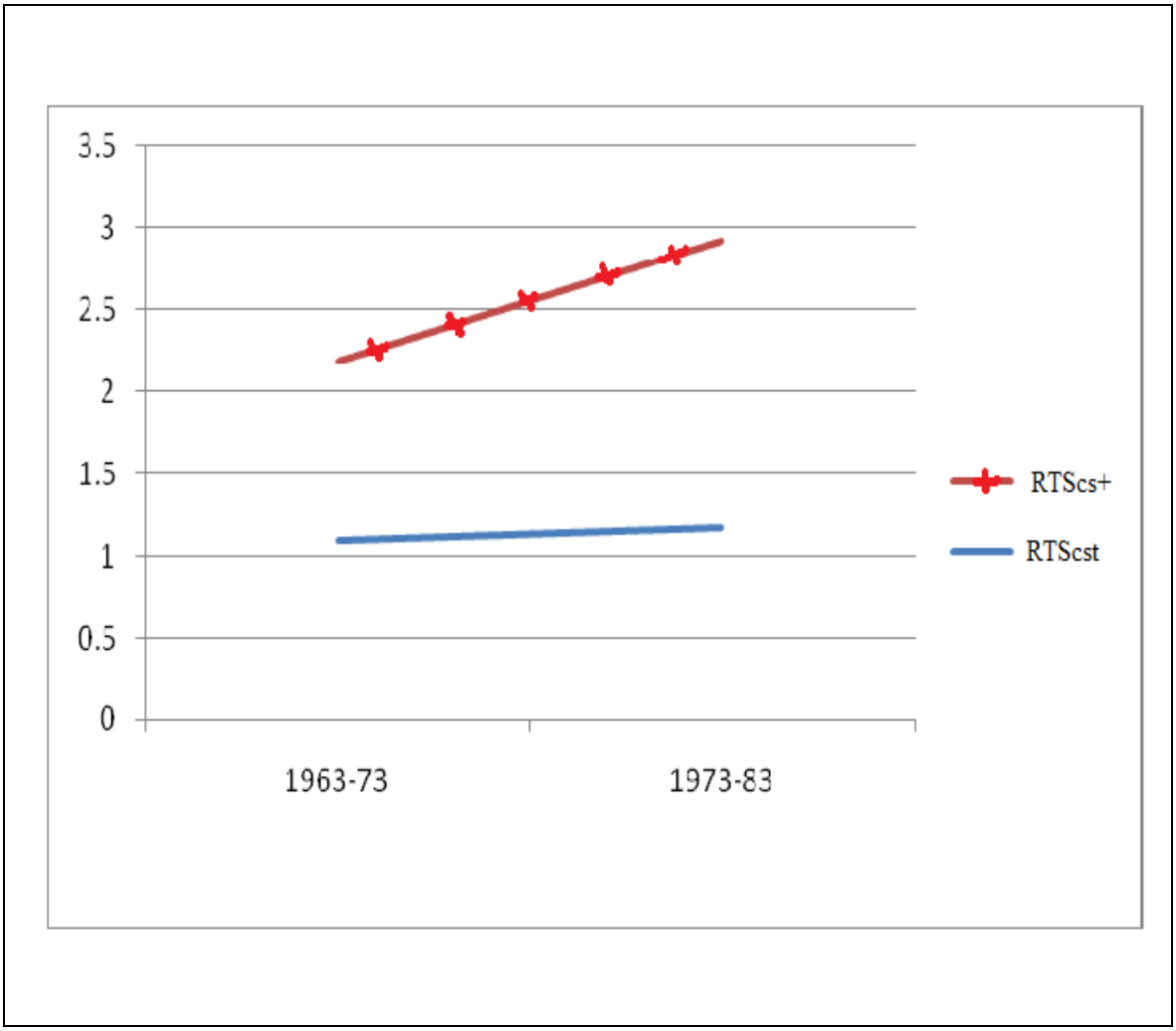

Figure 16. Technological parameters and two-capital data set.

Therefore, segmental data time analysis of the parameters also reaffirms the two important theses of the dissertation. One, that the new measured parameter contributes more per dollar returns for each dollar added to the new capital stock measure also adds to the comparative scale in the time span of the study.

The graph and the relative slopes are further illustrations of the same points. The positions of the two graphs also have important policy implication. That is to duplicate positive attributives effects of the parameters in the future, we need to understand and sustain the qualities and quantities of these parameters, which were very effectively contributing positively to the growth in the aggregated economic production.

A job creation policy proposal is less optimal, if it would disproportionally spend a new dollar, where only $0.02; two cents will return. In a ($14 trillion economy, that is approximately 300 billion dollars), unless it is balanced with more dollars to where $0.80 or more dollars are returned (an estimated eleven trillion dollars return) for each additional new dollar spent. That is, a portfolio adjustment at the national and global level of aggregate investment that favors V2, V3, but not to exclusions of V1. It is not a good idea to underinvest in productive parameters in such a way to create real rates of decay in the local, national, or global economies. The consequences are too consequential for all people.

The policy can dynamically stop cascading dead-mule bounces to a more sane recovery out of jobless financial schemes. That is, a more probable dynamic solution for our present global prerecession or postdepression conditions.

Remember scientifically, rationally, the term jobless recovery does not make any sense. It is a meaningless political conjecture. The financial conjurers devise it to hide lack of an economic recovery, for short-term political and financial gains out of the supply side schematics, while the demand side implodes the economy. The United States

was resolved once to deal with the cyclical aspects of economic depression. It was, and still is a good cause.

Modern Problems and Solutions

Application of Game Theory has found new students in applied econometrics and some social sciences are catching up to us. That is the way of science. The applications of the methodology were productive in the early 1980s-1990s for the Western economic data and political economy, in related analysis of technological change and economic growth theory and social welfare economics.

First, a historical presentation of the rate of growth of some key data shows us the importance of our new parameter. The gap between the promises of investment in innovative advancements and the real rate of growth of invested-funds in these key representative variables is remarkable. Then, the real untold global unemployment disaster is also phenomenal.

The dynamic view of the United States economic variable in most of the last millennium prepared us for the difficulties of this millennium already starting on very shaky grounds. We heard loudly about the millennium projects, investments in innovational programs, higher education. Like West Coast ocean fog, with a little sun light and logic, the mist dissipates.

The calculations of variables are to show the importance of their relations. The econometrics data analyses focus on their importance in this research. These variables play an important part and affect the technological parameters under study in this research. The moderation in cycles and the pattern of these growth rates over an extended time hold

combined with the age-composition of the population affects workers and demand side of the economy for years.

Figure 17 shows the growth rates for real GDP, (real gross domestic product, rG 20-04), the growth rate of population in the United States (rg_ResPop), the real growth rate of educational funding (Red), and the rate of the growth of real disposable income per capita (rdpipercapta).

It is important to realize that the growth rate for resident population in the United States has declined. The reduction in growth rate of educational funding (Red) predates economic downturns.

It is also true that economic cycles are facts. However, the violence of the large oscillations had mostly been tamed, until the recent two decades, when unguardedly, certain depression era laws were nullified, and risky investment instruments were introduced. Once again, this proves not all innovational changes are good. The externalities need to be studied very carefully. These are more reasons for more research and advancement of knowledge to study the follies. These areas should have received a better treatment.

Figures 18 and 19 show a graphic presentation of the realities between what a nation wants to do, and what they actually do about rate of growth of technological advancements, or advancement of knowledge by private and public means.

From 1970s, to end of the 1990s, we see that rate growth in funding has been negative by both the private and governmental institution. These under funding had been taking place in face of increasing global competition.

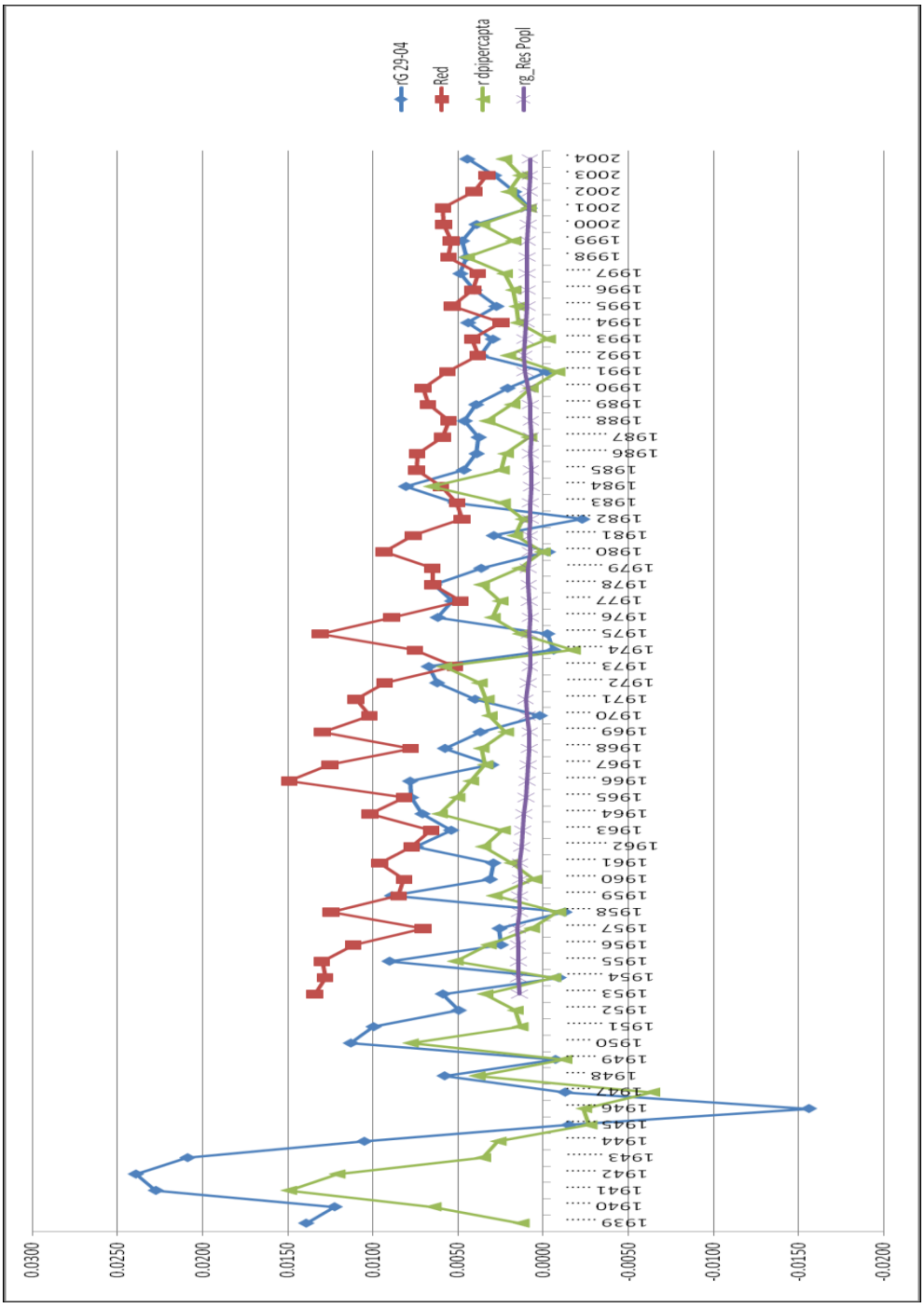

Figure 17. USA dynamic growth rates in key data.

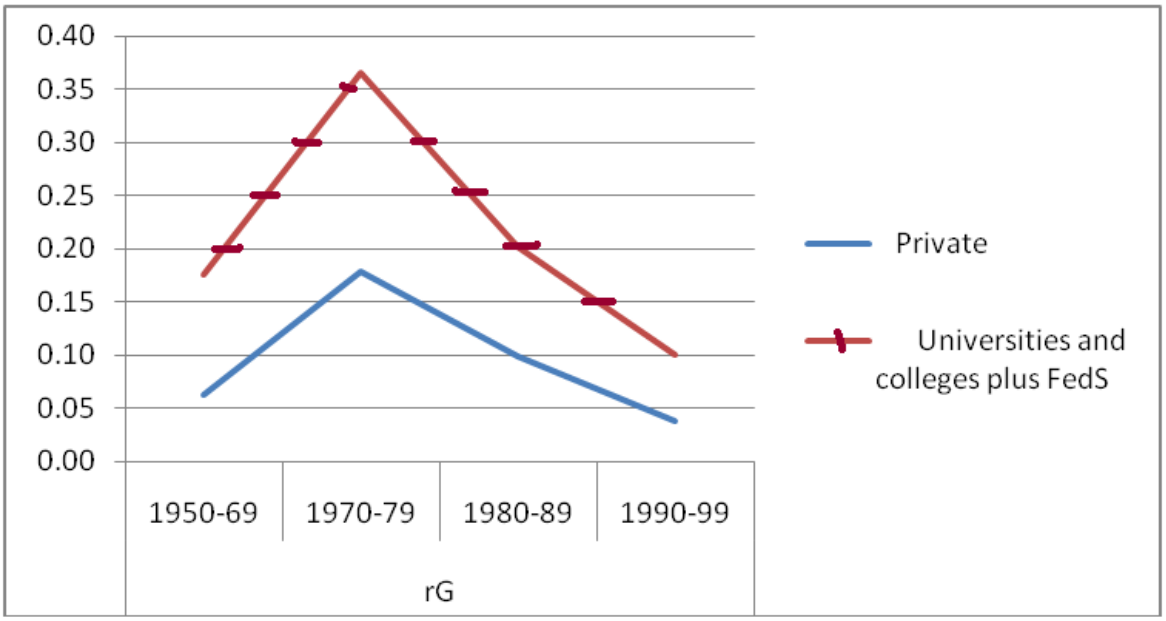

Figure 18. Rate of growth in private invested funds.

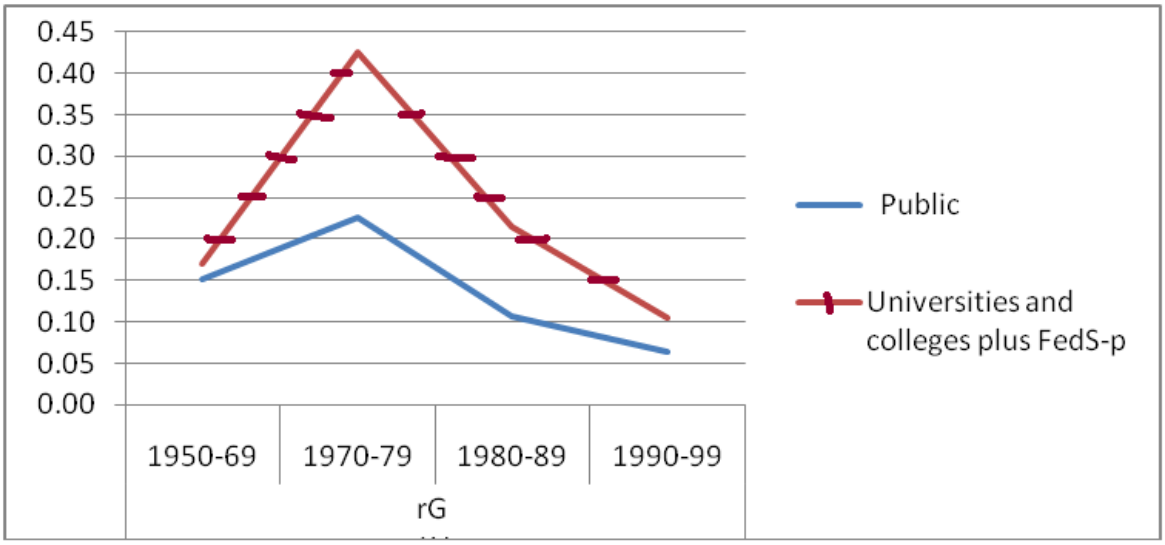

Figure 19. Growth rates of public invested funds.

A Global Catastrophe, Unemployment

In this shorter study, we look at the empirical data of Western economies and unemployment indices related to minorities and less represented elements of these economies, and study the correlation of their incidences of general social unrest in the same economies relative to each other.

The conclusion is not too difficult to ascertain, when the graphs are studied. What is more important is what each culture has designed to remedy the difficulties these complexities present. The very old European strategies of blaming the underdog and policies in lieu of genocidal eradications, war-solutions, and exporting the problems have consequences that are more dangerous, while mere militarisms will not remedy. Those golden old strategies of beg thy neighbor, loot thy neighbor, and burn thy neighbor, are as self distractive now as they were then. Given the state of knowledge, let us all do better. We are all able to do better now.

1. Fake assimilation to cheat the unknowing foreigners only delays and compounds the negative results.
2. Resource stripping them at home and cheating them out of employment at home and abroad will have definite economic complications. One of which is no adequate demand in a competitive condition facing other products-differentiated supply economies.
3. Undoing other democracies will guarantee you nondemocratic hostile alternatives. You will not like to deal with then, and they will not like to deal with you, without paying for negative externality with higher margins.

4. Torturing and border transgressions do not look good when dictators do them; they will not look good when democracies bamboozle themselves into doing them. Even, if the United Nation's words, gestures, or other institutions' actions supply the guarded-veils of indecencies.

Militarisms have an inescapable self-terminating economic progression to them. They are dependent on functionality of the whole economy. They also have self-perpetuating monopolistic tendencies internally. The finality of it is economically self-terminating. Either you have an exit plan at the start, or a hurried one carries you out with your head handed to you at the exit, with the blood of innocence on your reputation for decades.

Therefore, doing the right thing is not a new Political Correctness, or a bit of wisdom handed to you in a Chayi khaneh free, or psychobabbles in Western liberal art schools.[5] It has the power and logic of mathematical theories behind it. The most harmed are the war initiators in modern times; you best know that up front, as you aim to do well by others. The finality of consequences are not at first overwhelming or outstanding. Creeping, crippling unemployment comes dynamically over time. Manageably deceptive at first, it will dominate the economy. It becomes clausal toward the end. It creates its own niche, its own socioeconomics, and nihilistic politics.

Dynamically, it causes blighted towns, cities, states, and countries. The damages, the instabilities, become significantly larger, where imperfections thwart or dull the full forces of market and political signals. We have seen harm is inevitable. There, we will see again, interferences with democracy and free market signals will harm progress.

Policy makers if slow to respond will be nonresponsive to oncoming economic calamity. Often, the overconfident governments will not know what conglomerations of misfortunes will befall them.

Table 38 shows the estimation about the percentages of adult and youth minorities unemployed in some advance economies. It is very significant to comprehend that such statistic are difficult to obtain. Yet, they play such an important part in understanding of stability and sustainability of economic conditions in most economies. Table 38 shows a sample of such data.

Reducing fees and streamlining appropriate regulations, increasing employment naturally adds to the stability and hopefully more rational discourses. No entity has the time or resources to pay attention or remedy to the perceived irrational discourses of all sides. Figure 20 shows us; sometime it is wiser to pay attention and choose good policy.

There are significant correlation and regression pointing at serious social problems in this area. The studies that link emigration and minority youth increased incarcerations by the dominant cultures are not isolated issues. It will be like explaining the hangmen-noses displayed in modern institutions as a positive expression of freedom of speech! Demagogic inflammatory rhetoric is harmfully destabilizing.

Table 39 is a Bayesian decision matrix. It points out a number of policy and regulatory moves and policy studies, which will reduce negative externalities associated with maligned neglects. The Bayesian decision matrix index of over 50 percent will require government intervention, investments, and job creation, etc.

Table 38. The percentages of unemployed minorities in advanced economies.

Country	Unemployed adults		Unemployed youth		Totals
	Foreign	native	Foreign	native	
France	30	17	17	7	71
Sweden	23	9	16	6	54
Spain					44
UK	14	11	10	6	41
Germany	12	7	13	7	39
Canada	-	-	-	-	30
USA	-	-	-	-	29
Australia	-	-	-	-	28
Japan	-	-	-	-	27
Netherland	-	-	-	-	19

Notes. From the President report 2004.
Unemployment percentages of: adult (foreign, native), youth (foreign, native).

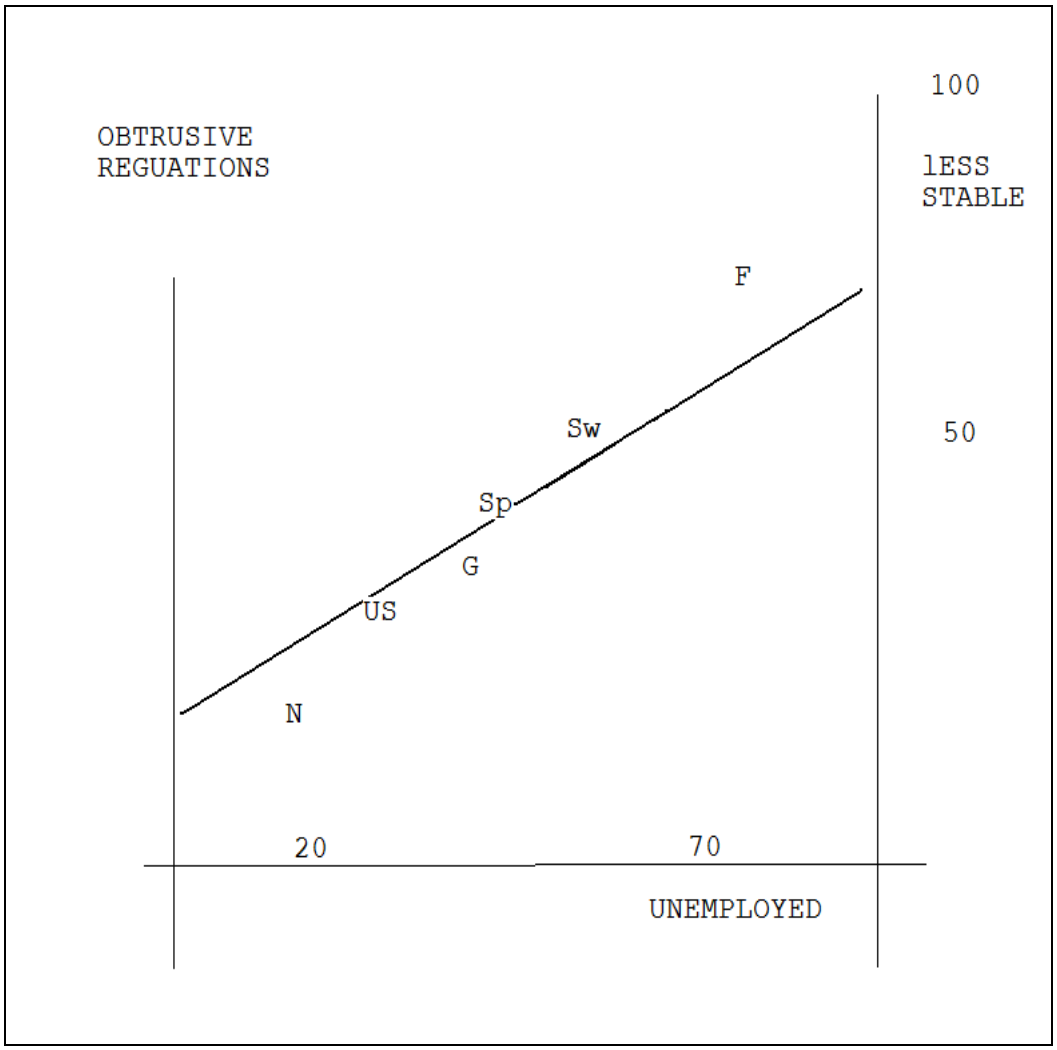

Figure 20. Policy matrixes for constructive trends.

Table 39. Using Bayesian decision matrix indices.

	low unemployment Gov-assists+ Job-retraining	high unemployment Gov-assists?- No job-retraining	Less barrier to Free & fair trade Allowing mobility of workers and CAPITAL
Lower fees and abstractive none inclusive laws, Inclusive	< 20%	50-70%	BDMI >50% Requires Intervention Gov. policies to reduce it. **** BDMI<50 Requires private Ngo assists To further stabilize. **** Job creation Fees-performance Realignments, Law reviews, Non-alienation Reviews, Modernizations, Ed.& job access
High fees And exclusive Punitive Regulations Exclusive	20-50%	70-100%	
Dangerous politics; Bigoted-xenophobic /exclusionary racer bating victimizing policies	More Stable Less costs Sustainable	Less Stable More costs Unsustainable	Policy modification required Anti racism Anti xenophobic Exclusionary-anti education (Bahman Fakhraie, 08;©®

Technological advancements are synonymous with development and growth. However, as we have studied it, with the externalities associated with it, it requires capital components, human, financial, educational, and stocks of capitals, in order to achieve sustainability of growth. That is, what will endure into sustainable development and maintenances of level of living most modern societies aspire to achieve. The certainty and durability of such achievements are very dependent on high degrees of cooperation among all human cultures. Hence, free trade and free market associations are theoretical vanguards in modern human history for progress, as less self-implosive methodologies of acquiring improved-economic states. Humanity also requires an accommodating political state to reason our path out of innate natural and genetic tendencies toward conflicts, to allow ourselves to obtain better lives. Since enlightenment and discovery of scientific methodology, there are degrees of optimistic certitudes, at least among the intellectuals and academics, such sustainable states of cooperative coexistence through free commerce are possible for all humanity, despite the stubborn unhappy tendency amongst all of us to regress. Are we willing to take the positive steps to achieve such a state of grace?

Proof and Summary

The thesis states the dynamic influences of technology and elemental factors of production --defined and measured in this dissertation-- are greater than commonly have been calculated or expected. The impacts of different measurements of capital stocks on embodied and disembodied technological variables on productivity and economic growth of national social products are tested. The role of a new capital stock measure introduced in the writing of Friedrich August Von Hayek, John Maynard Keynes,

and further developed by Evsey D. Domar and ignored by most modern economist are examined. Therefore, we focus on the demand and supply side of technological embodied in capital both human skill and produced goods and services and the economy. Therefore, the thesis was to calculate adjusted capital and traditional capital measure, adopt reflective technological variables, and study their impact on production. This dissertation has met those scholarly requirements exceedingly well. The econometrics analysis and graphic representation show the positive impact of those variables in the economy. The positively sloped graphic shows that dynamically, the adjusted capital measure combined with the newly added parameter reflect a constructive and increasing impact in the production over time.

In the derived demand for technological advancement, all-important elements that have encapsulated a growing focus and expanding financial forces to seek technological progress were studied.

In the supply-side analysis, the growing knowledge in human history has found its way into the production process globally. In this dissertation, a theoretical expedition has woven the human history in scientific discoveries into the production process. The existence of good ideas in no way directly produces a bright and useful saleable product. The journey is the academic discovery and the story. How a scientist, a researcher brings these elemental disconnected abstracts to a holistically functional concept is still very important; it is very financially beneficial to the society and it should remain beneficial to the individual researchers, writers, scientist, and discoverers despite the evidence.

The most advanced aspects of theoretical economics have been delegated to the social welfare theories. The significance of these bodies of theoretical advancement studies the potentiality of good and bad side effects of the technological machineries. These externalities can easily misappropriate and destroy resources and human living conditions. They can do it technologically, exceeding faster than any living or existing defense mechanisms could repair their immediate damages, or longer term consequences. In this study, a theoretical moderation path accommodates freer trade, more resource utilizations, and more employment to enhance growth and employment of resources, while avoiding wasteful methodologies that only accommodates extreme ends.

The global options are limited. They are not always all we desire. They are redistributed unjustly, or without egalitarian ethics. However, with the open market mechanism, democracies (or relative democracies), and some added-infrastructures, the level of lives will improve in growing circles of humanity than present situations allow in large regions of Africa, Asia (including Eurasia), and South America. Nevertheless, it is comically insincere, for advanced mixed economies to become austere budget balancing capitalists as political opportunists. They are all beneficiaries of Keynesian redistributions' theories (with sustainable supply and demand sides' equilibrium and balancing mechanism). They become self-prescribed Adam Smith capitalists' economists on behalf of trans-global monopolists; even Adam Smith would not recognize them. The pretzel-convolutions occur, when the issue of North–South or sustainable development and economic growth for the South comes to discussion. Unfortunately, the current degree of human miseries and ubiquity of global communications are such that we will share the

humanities' fortune and misfortunes alike, wherever we are, and regardless of any moral ambiguities or theological complexities and cultural differences. Either we are fueling the flames that burn us all or we resolve our differences and agree to grow the trees and crops of heaven together to feed us all.

The concept of national wealth building has expanded to include a global concept of wealth building, with thoughtful selection of appropriate technologies to accommodate sustainable strategies, along the integration strategies to improve human conditions globally. In this study, adjusted capital and new technological parameters allow us strategically to complement creative-destruction works, by dynamic creative-construction strategies to avoid the implications of economic failures, and to respond correctively for sustainable developments needs of humanity in the present and future.

Notes

[1] Michael D. Intriligator, *Econometric Models, Techniques, and Applications* (New Jersey: Prentice Hall, 1978), 288-292

[2] J. Johnson, *Econometric Methods*, 2nd ed., (New York: McGraw-Hill, 1972), 293

[3] Henderson and Quandt., *Microeconomic Theory; A Mathematical Approach,* 2nd ed., (New York: McGraw-Hill, 1972), 191-199, 280

[4] R.S. Pindyck and D. L. Rubinfeld, *Econometric Models and Econometric*, 2nd ed. (New York: McGraw-Hills, 1981), 157-164

[5] Ghahveh khaneh, Chayi Khaneh, Coffee shops are common Eastern and Middle Eastern establishment. They are like electronic shops, pubs, and bars in the western countries. People congregate (smoke) drink tea or coffee, and trade or exchange information.

APPENDIX A

ARITHMATIC OF PRODUCTION FUNCTION

The traditional production function mathematical evaluation for optimization analysis is as follows:

Traditional productions function,

$$o = f(v_i^{\varepsilon})$$

Necessary condition:

$$f'(v_i^{\varepsilon}) > 0$$

Sufficient condition:

$$f''(v_i^{\varepsilon}) > 0$$

The traditional production function is with mathematical evaluation for optimization analysis.

Conditions in Case of Growth

$$o = f(v_i^{\varepsilon})$$

Necessary condition:

$$f'(v_i^{\varepsilon}) > 0$$

Sufficient condition:

$$f''(v_i^{\varepsilon}) > 0$$

Implication: the function is positive and increasing at the increasing rate.

Condition in Case of Decay

$$o = f(v_i^{\varepsilon})$$

Necessary condition:

$$f'(v_i^{\varepsilon}) > 0$$

Sufficient condition:

$$f''(v_i^{\varepsilon}) < 0$$

Implication: the function is positive and increasing at the decreasing rate.

Production Function

The production function with new technological parameters and the transformative analysis of the parameter.

$$y_i = aC_i^{\alpha} L_i^{\beta} k_i^{\delta} e_i^{u}$$

$$\sum_{n+1} \alpha + \beta + \delta \geq \sum_{n} \alpha + \beta + \delta$$

Under certain conditions, it yields sustainable economic growth.

$$\sum_{n+1} \alpha + \beta + \delta \leq \sum_{n} \alpha + \beta + \delta$$

Under certain conditions, it yields to economic decay.

The Log Linear Production Function

$$\mathbf{y} = Ae^{a} c^{\beta} l^{\propto} k^{\vartheta} e^{u}$$

$$\ln y = lnA + alne + \beta lnc + \propto lnl + \vartheta lnk + ulne$$

$$\ln y = \sout{lnA}0 + \sout{alne}1 + \beta lnc + \propto lnl + \vartheta lnk + \sout{ulne}1$$

$$\ln y = a + \beta lnc + \propto lnl + \vartheta lnk + u$$

Such that:

RTSt=f (a, v1, v2, v3, v4)

And

RTSn=f (a, v1, v2, v3, v4)

Proof:

RTSn>RTSt

The next segment shows Sheppard Lemma. The welfare theory and production function are studied.

APPENDIX B

SOCIAL WELFARE FUNCTION

In this mathematical treatment, the social welfare function shows as an ordinal index of societies' welfare. It is a function of utility levels of all individuals functioning in productively in that economy. It is not unique, and it involves value judgments. It is a systematic Optimization of all markets forming the economy. The social welfare function is as follows:

$$\boxed{w = w(u_i, u_j, \ldots, u_n)}$$

The societies' welfare function depending on ith individuals' utility function.

$$\boxed{u_i = u_i(q_{11}^i, q_{12}^i; x_i^* - X_i)}$$

$$\boxed{u_j = u_j(q_{21}^j, q_{22}^j; x_j^* - X_j)}$$

The social welfare function with respect to societies' production function is set equal to zero. This is set in the following Lagrange function; it is to calculate Sheppard lemma:

$$\boxed{Z^* = w^*[u_1(q_{11}^i, q_{12}^i; x_i^* + X_i), u_2(q_{21}^j, q_{22}^j; x_j^* - X_j)] + \lambda F^*(q_{11} + q_{21}, q_{12} + q_{21}, X_i + X_j) = 0}$$

Then $\boxed{q_{ij}}$ is the amount of the jth commodity consumed by the ith individual and $\boxed{x_i}$ is the amount of work done by the ith individual, as part of total related work and leisure time of

ith individual shown as Xi. The overall work and leisure are the sum of Xi+Xj.

Societies' production function is:

$$F(q_{11}^{i}, q_{12}^{i}; q_{21}^{j}, q_{22}^{j}; X_i + X_j) = 0$$

After we set Z = 0 for the first order condition, we carry out the derivations for the above formula, to find Z'.

F.O.C

$\exists$

$$\frac{\partial Z}{\partial q_{11}^{i}} = w_1^* \frac{\partial u_1}{\partial q_{11}^{i}} + \lambda F_1^* = 0$$

$$\frac{\partial Z}{\partial q_{12}^{i}} = w_1^* \frac{\partial u_1}{\partial q_{12}^{i}} + \lambda F_2^* = 0$$

$$\frac{\partial Z}{\partial X_i} = -w_1^* \frac{\partial u_1}{\left(x_i^* + X_i\right)} + \lambda F_3^* = 0$$

$\exists$

$$\frac{\partial Z}{\partial q_{11}^{j}} = w_2^* \frac{\partial u_2}{\partial q_{11}^{j}} + \lambda F_2^* = 0$$

$$\frac{\partial Z}{\partial q_{12}^{j}} = w_2^* \frac{\partial u_2}{\partial q_{12}^{j}} + \lambda F_2^* = 0$$

$$\frac{\partial Z}{\partial X_j} = -w_2^* \frac{\partial u_2}{\left(x_j^* + X_j\right)} + \lambda F_3^* = 0$$

∃

$$\frac{\partial Z}{\partial \lambda} = F(q_{11}^{i}, q_{12}^{i}; q_{21}^{j}, q_{22}^{j}; X_i + X_j) = 0$$

In order to verify we meet the Pareto Optimum condition we demonstrate by the following formulations.

P.O.C.

$$\frac{\frac{\partial u_1}{\partial q_{11}^i}}{\frac{\partial u_1}{\partial q_{12}^i}} = \frac{F_1^*}{F_2^*} = \frac{\frac{\partial u_2}{\partial q_{21}^i}}{\frac{\partial u_2}{\partial q_{22}^i}}$$

$$\frac{\frac{\partial u_1}{\partial q_{11}^i}}{\frac{\partial u_1}{\partial \left(x_i^* + X_i\right)}} = \frac{F_1^*}{F_3^*} = \frac{\frac{\partial u_2}{\partial q_{21}^i}}{\frac{\partial u_2}{\partial \left(x_j^* + X_j\right)}}$$

Here, the rate of consumer substitutions equates the rate of production technological transformations.

APPENDIX C

TECHNOLOGICAL CHANGES AND INTERNATIONAL TRADE SURPLUS

International Trade assists economies as sources for increasing level of living.

It is note-worthy that without technological advancements and production possibility growth, even trade will not benefit or increase the benefits to the economy sufficiently. The exchange line shifts from T1 to T2, and as noted in region A, the economy falls back to the lower public indifference curve. With technological advancements in both economies, we move to region C, beneficial to both trading economies (Ψ_1, Ψ_2), at the given exchange-trade, line T_1' resources and higher population over time are better employed. The level of living also improves. X^1 and X^2show trade surpluses in both country 1 and country2. The production possibilities frontiers and locus of possible production curve are assumed to retain its normal concave appearance in time, but initially reflect the irregular nature of methods available for investments.

In Figures 21, 22, 23, borrowing to invest in new technologies and improvement in level of utility curves are demonstrated. Figure 21 shows the two period shifts from one technological production locus to another by giving up current consumption and falling back to a lower preference at the current period, and investing it in new technologies.

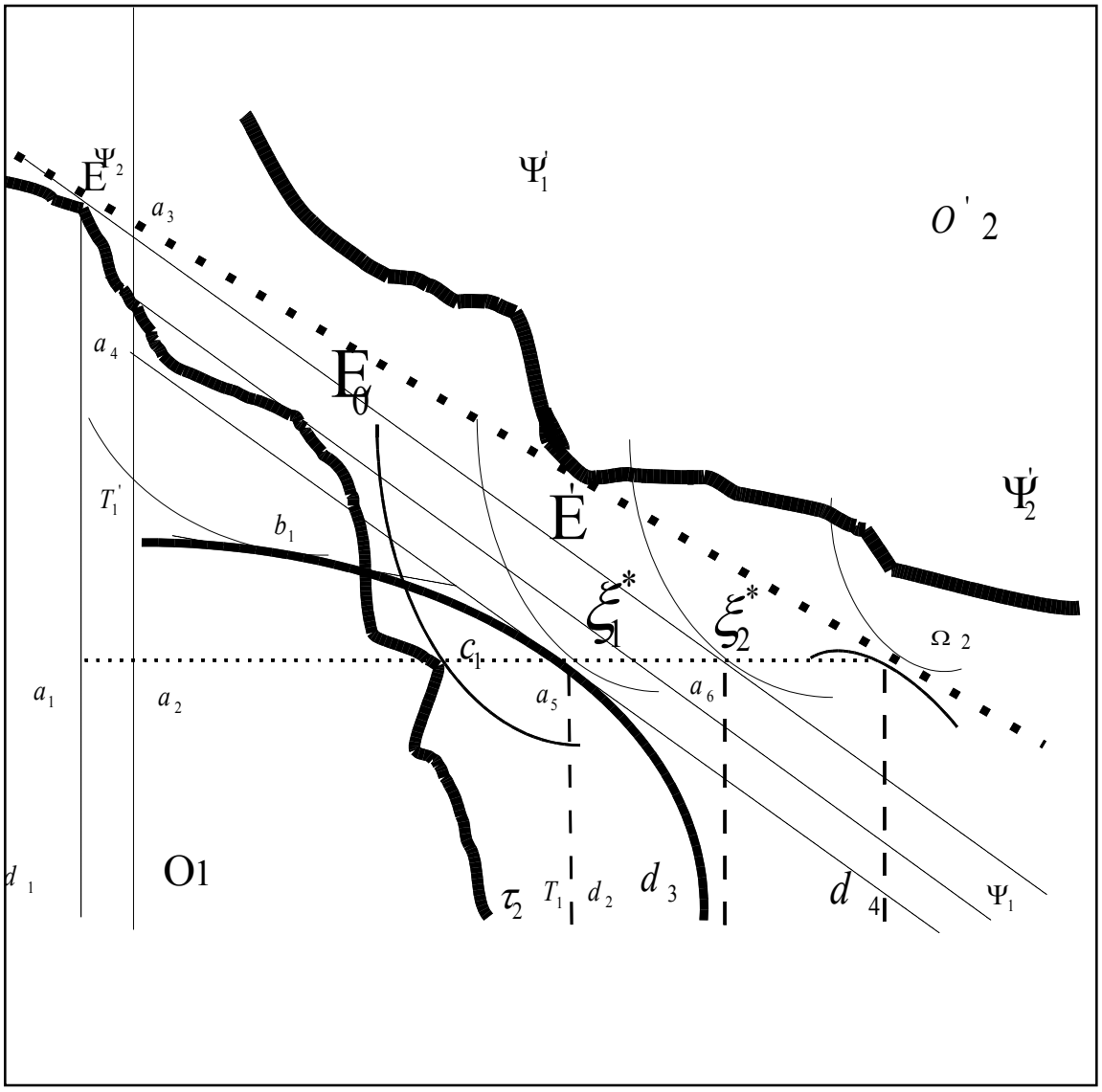

Figure 21. Investment in new technologies.

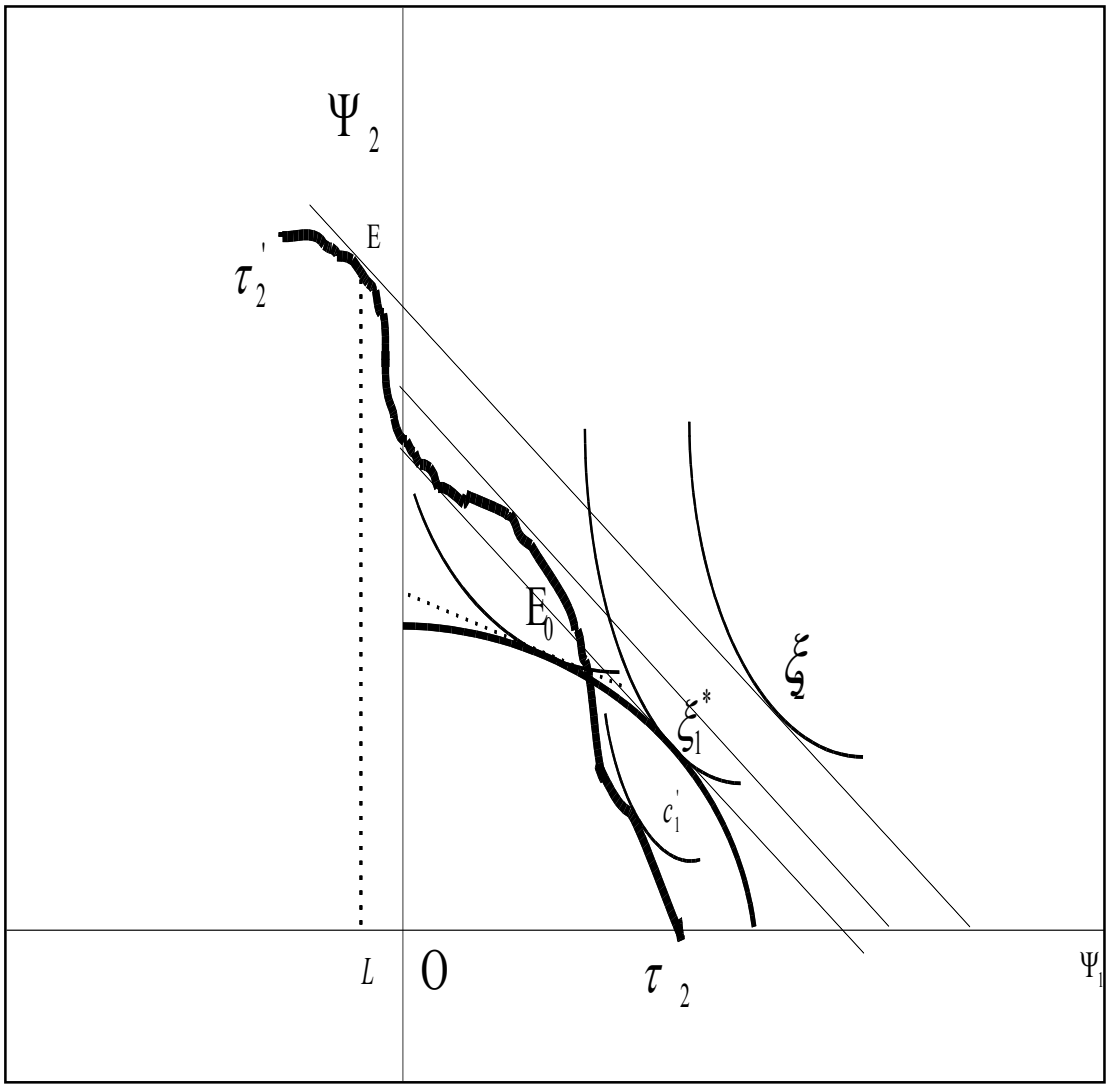

Figure 22. Trade after investment in new technologies.

Trade after investment in new technologies: shows the two period shifts from one technological production locus to another by giving up current consumption and falling back to a lower preference at the current period, and investing it in new technologies. Figure C.3 shows trade after investment in new technology. The production possibilities frontier at E2 with new technology purchase with borrowed funds, and after trade, will put the consumer at omega 2, which is a much higher indifference curve than omega 1.

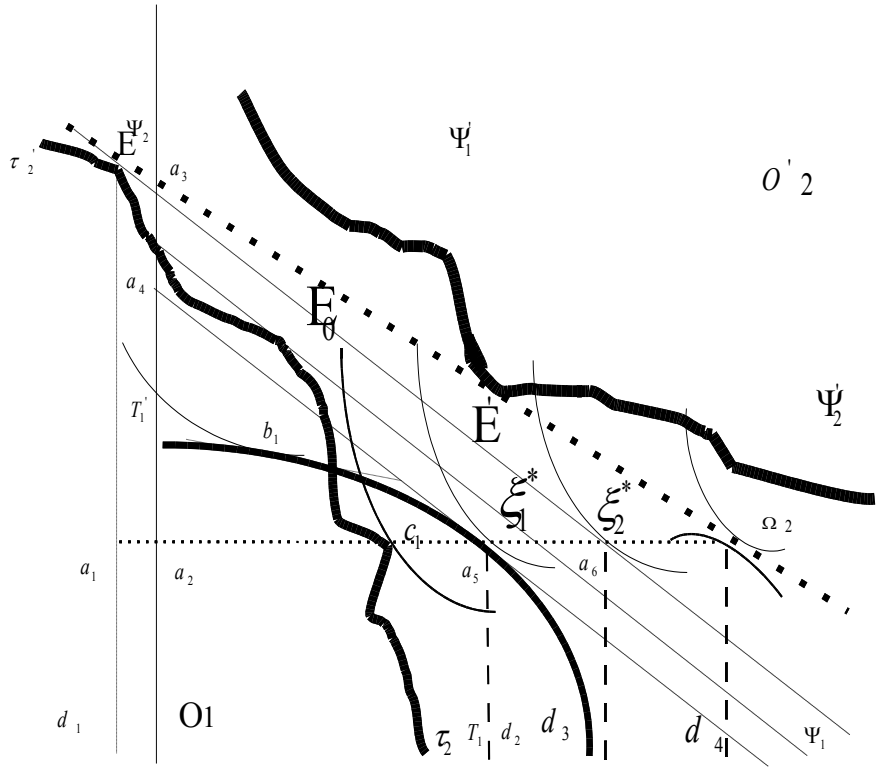

Figure 23. Trade after investment in new technologies.

APPENDIX D

TECHNOLOGIES AND EXCHANGE RATE

The real foreign exchange rate = e

Is a function of domestic output= Oi

Over foreign trade partner's output=Oj

e - Real exchange rate in country i.

O - Output in countries i and j.

Tec - Technological injection and effects on output.

X - Export in countries i and j.

M - Import in countries i and j.

$$\mathrm{O}_i \approx F\left[\mathrm{O}_i\left(Tec_i, X_i, M_i, er_i\right)\right]$$

$$O_j \approx F\left[O_j\left(Tec_j, X_j, M_j, er_j\right)\right]$$

The Exchange rate and Technological Injections

$$e \approx \frac{O(tec_i, X_i, M_j, er)}{\lambda'[O_j(tec_j, X_j, M_j, er)]}$$

$$e \approx \frac{E_i P_i}{\lambda' P_j}$$

Definition:

e - Real exchange rate in country i.

O - Output in countries i and j.

Tec - Technological injection and effects on output.

X - Export in countries i and j.

M - Import in countries i and j.

λ - A constant, exogenous or non-market influences real exchange rates.

$$e_i \equiv \frac{O_i(Tec_i, X_i, M_i, er_i)}{O_j(Tec_j, X_j, M_j, er_j)}$$

$$\Delta e_i \approx \Delta O_i - \Delta O_j$$

In cases of pure competitions and comparative advantages, the importance and impact of technological advancements become even more profound. However, increasingly, failed state instability conditions and issues reinstate sustainable growth and foundation conditions requirements of sustainable development theory. Here, we introduce lambda i,j as the exogenous injection of technology and knowhow to enable commerce, and free trade via exchange rate adjustment, either by direct sustainable growth increases in tradable production, or by current machinations of high rate loans, aid, and food supplementation. The latter approach with the added unfortunate HIV removal of the subsistence human capital will deplete their current subsistence level of production methods, and make these economies helpless and dependent.

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To formulate optimum functionality in management teams, in order to make profitable and beneficial contributions, and create opportunity for merited advancements. Utilizing a rare combination of theory and empiricism, cultivated in multi-cultural inclusive settings in academic and private enterprise, I enhance the productivity and completion of project management. I have experience, among fields of international trade, management, and

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Goals:

I have initiated, passed by majority votes, and funded many constructive projects --goals by committees--, where it has been value enhancing and mutually beneficial individually, and by team cooperation.

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Thesis statement:

The dynamic influences of technology and elemental factors of production --defined and measured in this dissertation-- are greater than commonly have been calculated or expected. The impacts of different measurements of capital stocks (traditional and new adjusted capital) on embodied and disembodied technological variables, on productivity, and economic growth of national social products are tested. The econometric effects of two new capital stock measures introduced in the writing of Friedrich August Von Hayek, John Maynard Keynes, and further developed by Evsey D. Domar, and ignored by most

modern economists are examined. Therefore, we focus on the demand and supply side of technology embodied in capital, in human skill and produced goods and services, and the economy.

Post Doctoral Goals:

1. Updating the econometrics of the dissertation to most recent available data and dates. (Per available research grants and fellowships, or contracts)

2. Apply the new discoveries to include countries, with acceptable data in the econometric study, set up formulaic iterations, and new development in Excel-computer software for easier application. (Per available research grants and fellowships, or contracts.)

3. Focus on the theoretical advancement in production processes for systemic innovational additive methodologies, in movie production, agriculture, and other creative industries, using existing or newly hired faculties, in anchored and linked institutions. This is an academic contribution in the shadows of the great economists like Adam Smith, Schumpeter, Usher, Domar, Hayak, Keynes, and others.

4. Streamline methodologies, iterations, and projects for Ph.D. Students, master students, and introductory fields' level, an extension of the dissertation and current copyrighted writings. (per available research grants and fellowships, or contracts, teaching contracts.)

5. Of course, this will be under Sec G of private contract and without infringing on rights of marketing, publishing, and distribution of the same. Certain contracts will be more restrictive, including specific names.

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Computer Languages, Spread Sheet Data Analysis, Writings

Multimedia & Creative Skills: Film and video production, CDR: audio and video works

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Utah State University: Economics Department, Persian language, and cultural studies to faculty and students, and teaching assistance for Agricultural Economics.

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Student leadership positions AUSU, with assistance and an invite from President Taggart, The ambassador was invited and attended Nurooz with art and cultural exchange team to USU, and Logan Utah.

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Founder and Management of Money Wise Firm (A Private Financial Education Foundation for Personal Financial studies), 1970 to Present. (Under legal notes , and Sec g of private contract)

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