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The Long Recession and the Economic Consequences of the Pandemic

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ABSTRACT

In this article, we argue the rate of profit in combination with the movement of the real net profits determines the phase-change of the economy in its long cyclical pattern. Since WWII, the US and the world economy have experienced two such long cycles. The pandemic COVID-19 has deepened a recession that has been already underway since 2007. The growth rates in the first post-pandemic years are expected to be high; however, soon after, the economies will find themselves back to their old recessionary growth paths. The onset of a new long cycle requires the restoration of profitability, which can be sustained only through the introduction of ‘disruptive’ innovations backed by suitable institutional arrangements

Key Words: Long recession, secular stagnation, pandemic, long cycles, institutional changes, disruptive innovations

JEL Classifications: B5, D33, E1, N12, O51

1. Introduction

There is enough evidence that the US and the World economies are from 2007 onwards in a lasting recessionary state. Such a situation has also received the approval of prominent economists, who have resurrected the almost forgotten Alvin Hansen's secular stagnation (SS) thesis (Summers 2014, Krugman 2014, R.J. Gordon 2016, among a host of others). Unlike the SS thesis, in our discussion of the US and by extent the World economy, we explain the slowdown in economic activity through the falling rate of profit, which in the long run leads to the stagnating mass of real net profits and, in so doing, discourages net investment and increases unemployment. Furthermore, we argue that there is neither perpetual prosperity nor permanent stagnation; underneath the currently stagnation phenomena, there are forces at work acting in restoring profitability, which coupled with suitable new institutional arrangements, may create a new economic environment paving the way for the onset of a new long cycle.

Since the industrial revolution of the last quarter of the eighteenth century, the above long cycles scenario has been repeated five times; however, it is questionable whether the same dynamics are already at work and are strong enough to give rise to a sixth repeat.¹ Meanwhile, the pandemic of 2020-2021 deepened a prolonged recession already underway and, at the same time, accelerated the rate of introduction of new innovations impacting employment in ways altogether different from those in the past, compelling the creation of new institutions to corroborate these changes. The question is to what extent, if any, these innovations motivated by the pandemic have the dynamics of the old ones and they will restore and sustain profitability at high levels and by doing so provide the fuel for the upturn of a sixth long cycle.

The remainder of the article is structured as follows: Section 2 introduces the long cycles and the associated phenomena. Section 3 explains the currently downward phase as a result of the movement in profitability. Section 4 brings relevant statistical evidence based on the estimation of two logistic curves using quarterly data on the US corporate real net profits spanning the period 1946:1 - 2020:4. Section 5 discusses the effects of the pandemic and its impact on the cyclical movement of the economy. Section 6 summarizes and makes some concluding remarks about future research efforts.

2. Long cycles and the current state of the US economy

The idea of the long cyclical movement of the economy is old and can be found mainly in the works of Kondratiev (1935, 1998). Schumpeter (1942) and the approach based on the social structures of accumulation (Gordon *et al.* 1987) point to different explanations of the long cycles. The Schumpeterian interpretation is couched on the

¹ The periodization of long cycles is as follows: First long cycle: 1790s to 1840s (up: 1790–1815; down: 1815–1845). Second long cycle: 1840s to 1890s (up: 1845–1873; down: 1873–1896). Third long cycle: 1890s to 1940s (up: 1896–1920s; down: 1920s–1940). Fourth long cycle: 1940s to 1980s (up: 1940–1965; down: 1966–1982). Fifth long cycle: 1980s to the present (up: 1982–2007; down: 2007–present) (Tsoulfidis and Papageorgiou 2019).

‘swarms of innovations’, which lead to the rising stage of the long cycle while the completion of their diffusion brings the economy to its stagnating phase. The proponents of the social structure of accumulation argue that the introduction of suitable institutional framework is what propels long term growth but, past a critical point, the same institutions become a burden that slows down the growth rate of the economy necessitating a new set of growth promoting institutions.

In this article, we argue that the innovations and the required institutional setup, along with a host of other phenomena (volume of international trade, sovereign defaults, social unrests, and international conflicts, among others) are the results of the evolution of the profit rate, an explanation more consistent with Kondratiev, as this can be derived from his response to his critics (Kondratiev 1998). Kondratiev, although not a Marxist, was more in determining endogenously the movement of long cycles through the interest (profit) rate. He opposed to the idea of exogenously determined shocks such as innovations, wars, new markets and sources of raw materials and the like, whose likelihood of occurrence or discovery is derived from the inner dynamics of the system. In the same spirit, even the Covid-19 pandemic would not be considered an external but rather an internally generated shock caused by environmental and economic changes driven by the restructuring of agriculture, urbanization, globalization, and neoliberal economic policies favoring unregulated markets.

Naturally, this explanation is consistent with Marx's view of the law of the tendentially falling rate of profit, albeit he did not live to experience not even the end of the second long cycle. If the rate of profit is in its long-run downward direction, the probability of default, on average, is higher, much higher, than the risk of innovation. The long-lasting downturns in economic activity and the associated with it falling rate of profit constitute the ideal environment for the flourishing of groundbreaking innovations (such as those of steam engine, railroads, electricity, *etc.*) and the introduction of epoch-making institutional changes (such as those during the New Deal in the 1930s and the dismantling of various institutions of the so-called welfare state replacing them by others, during neoliberalism in the 1980s).

The current recessionary phase of the long cycle bears many similarities with those of the past, but we must note that each particular phase possesses its own unique features. For example, the 1946-1965 rising phase of the fourth long cycle has been characterized as the ‘golden age of accumulation’ because of the high growth rates while in the following recessionary period until 1982, the unemployment rates were moderate and the inflation rate was unusually high for a recessionary phase of a long cycle. The 1983-2007 rising phase of the fifth long cycle has been characterized as the ‘great moderation’ because of its low inflation rates, low interest rates, and shallow business cycles. The same does not hold for the recessionary post-2007 phase which is inflicted by rising income inequalities and polarization, some bubbles, and two severe downturns in the years 2009 and 2020. The downturn caused by the pandemic is the worst in the post-WWII period and is estimated for the USA at -3.5%; to get an idea of the size of the

downturn in 2020 it is worth mentioning that the downturn in 1982 was only at -1.82% while that in 2009 was -2.9%. In the South European countries, the growth rate in 2020 is estimated at -9.3% while the EU's average is about -6.1%; in China, the growth rate in 2020 is positive at 2.3%, which is about three times lower than its average of the recent decade(s) (see also Figure 1 below).

There is no doubt that the pandemic Covid-19 will leave its indelible mark on the economic history of this century, as this can be ascertained by comparing its growth reduction effects with those of 1918 influenza, during which the USA growth rate from 8.6% dropped to 0.8% in 1919. Nevertheless, such a slowdown cannot be compared to the drop in 1922 estimated at -2.3%, let alone the year 1932 when the growth rate of real GDP dropped -13.8%.³ Hence, it is important to emphasize that the 1918-1919 influenza inflicted the USA and the World was in the upturn of their long cycle while the magnitude of its impact on the growth rate confirms a stylized fact of the long cycles. That is, when the economies are in their upturn, the frequency of recessions is lower and their depth shallower; the exact opposite is observed in the downturn of the long cycle, as we are experiencing with the current pandemic.

Figure 1 below displays the growth rates of the real GDP of the USA, China, and the World economy. The data come from the IMF's publication (www.imf.org/external/datamapper) spanning the period of the fifth long cycle and give rise to a visual understanding of the evolution in economic growth and the Covid-19 effect. We observe that the rising phase of the fifth long cycle (1983-2007) was marked by shallow business cycles. The same does not hold for the post-2007 phase, which was punctuated by two severe downturns, namely the 2008-2009 and the one induced by the pandemic in 2020-2021.

³ The real GDP data estimates of growth rates for the years 1918 and 1919 are from the Economic History database <https://eh.net/databases> while the more recent ones are reported in the IMF's database www.imf.org/external/datamapper that starts from 1980.

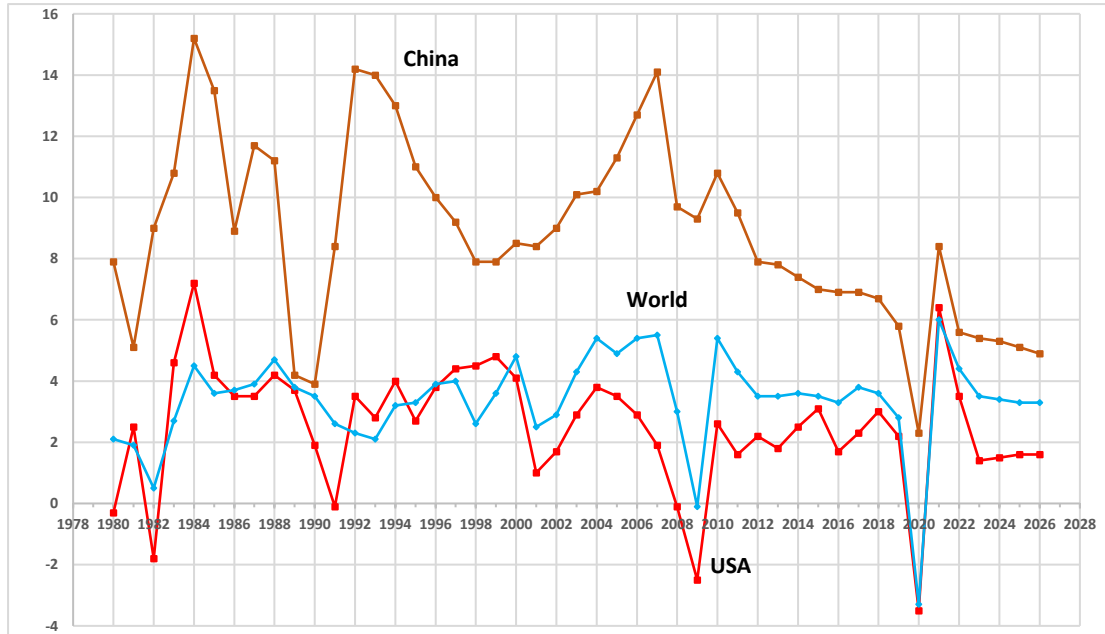


Figure 1: Growth rates USA, China and World Economy, 1980-2026

In the same Figure 1, we also observe that from 2021 onwards, the projection by the IMF is that pretty much the economies will return to the low stagnating growth rates of the post-2007 period. It is interesting to note that the IMF’s time-series data, coincidentally perhaps, spans the period of a nearly long cycle, which, as we argue below, is expected to be completed around the same year.

The post-2007 period anemic growth rates and the two severe downturns have resurrected the old notion of SS whose current version emphasizes the gradual but substantial shift from a younger to an older population age structure, whose high saving propensity is responsible for the low investment. Other variants of SS thesis single out the rising income inequalities (Krugman 2014) and the diminishing returns to new innovations (R.J. Gordon 2015).⁵

3. Rate of profit, real net profits and stagnating investment

The main argument of the article is that long cycles are induced by the long-run movement in the profit rate and the mass of real net profits. All start with the nature of capital which is oriented in the extraction of maximum possible profit and in competition with labor and other capitals. This two-front competition leads to the mechanization and the automation of the production process and to a rising capital-output ratio or, what is the same, a falling maximum rate of profit. The latter compresses the economy-wide rate profit to an even sharper fall, as we know from the pertinent

⁵ R.J. Gordon’s explanation echoes a similar but broader view according to which all major scientific discoveries have been already made, and from now on only minor improvements of the old ones are left at our disposal (Horgan 1996).

literature (Shaikh 1992, 2016; Tsoulfidis and Tsaliki 2019). Starting with the profit rate defined as

$$r = \frac{\Pi}{K} = \frac{\text{Profits}}{\text{Invested Capital}}$$

and by taking growth rates, we get

$$\hat{\Pi} = \underbrace{\hat{r}}_{\pm} + \underbrace{\hat{K}}_{+}$$

As long as the right-hand side of the above equation is positive, the mass of net real profits is growing, and the economy is in its upward stage. If the rate of profit is in its downward direction, and the rate of its fall is less than that of the growth rate of capital, the mass of real net profits will be still rising. Under these conditions, the economy expands at a healthy growth rate, as output, demand, employment are all on their rise, and an aura of optimism permeates society. For example, in the 1990s during the upturn of the long cycle, opinion makers and economists used to assert that the modern economy is not affected any more by severe recessions, as in the past. The cliché was that our ‘new economy’ is qualitatively different from those in the past, because of the rapid spread of information and its efficient utilization by firms which, on average, make the right decisions, thereby rendering the economy depressions proof. This view was almost “forgotten” in the mid-2000s with the burst of the real estate and stock market bubbles. Quite similar was the optimism that prevailed in the 1960s when, once again, the economy was thought to be depressions-proof because of the prevailed ‘mixed economy’ in which state intervention through the appropriate mix of fiscal and monetary policies could maintain the economy in its stable and healthy growth path. But during the stagflation crisis in the 1970s, these views ceased to be popular.

As the economy is in its upward phase, the rising investment and the built-up of capital stock lead to a rising capital-output ratio, which eventually gives rise to a falling rate of profit followed by a positive albeit falling growth rate. The positive but falling growth rate and the negative growth of the profit rate reach to a critical point neutralizing each other out, leading to the stagnating mass of real net profits. As a consequence, past this tipping point of real net profits, investment is withheld and together with the rising unemployment mark the onset of the crisis. But why is investment withheld? The answer relates to the stagnating real net profits; with no incremental profits, why would businesses (on average) invest? The slowdown in investment induces financial institutions to grant new loans to recover the old ones. However, new loans require the expansion of economic activity, which may become possible through lower real interest rates and the tempering of lending standards. Meanwhile, firms in the face of falling interest rates and profitability, would rather buy back shares, distribute dividends or invest in titles and not invest in real capital. As a consequence, bubbles are being created and at the same time, the long-lasting

recessionary situation creates a suitable environment to foster new innovations. The idea is that falling profitability, in the long run, reaches the critical point where the risk of default outweighs the risk of innovation. The so-called ‘disruptive innovations’, as it has been repeatedly argued, are introduced towards the end of the recessionary phase of the long cycle (Tsoufidis and Papageorgiou 2019 and the literature cited there). Figure 2 below summarizes the chain of events over the full period of a long cycle.

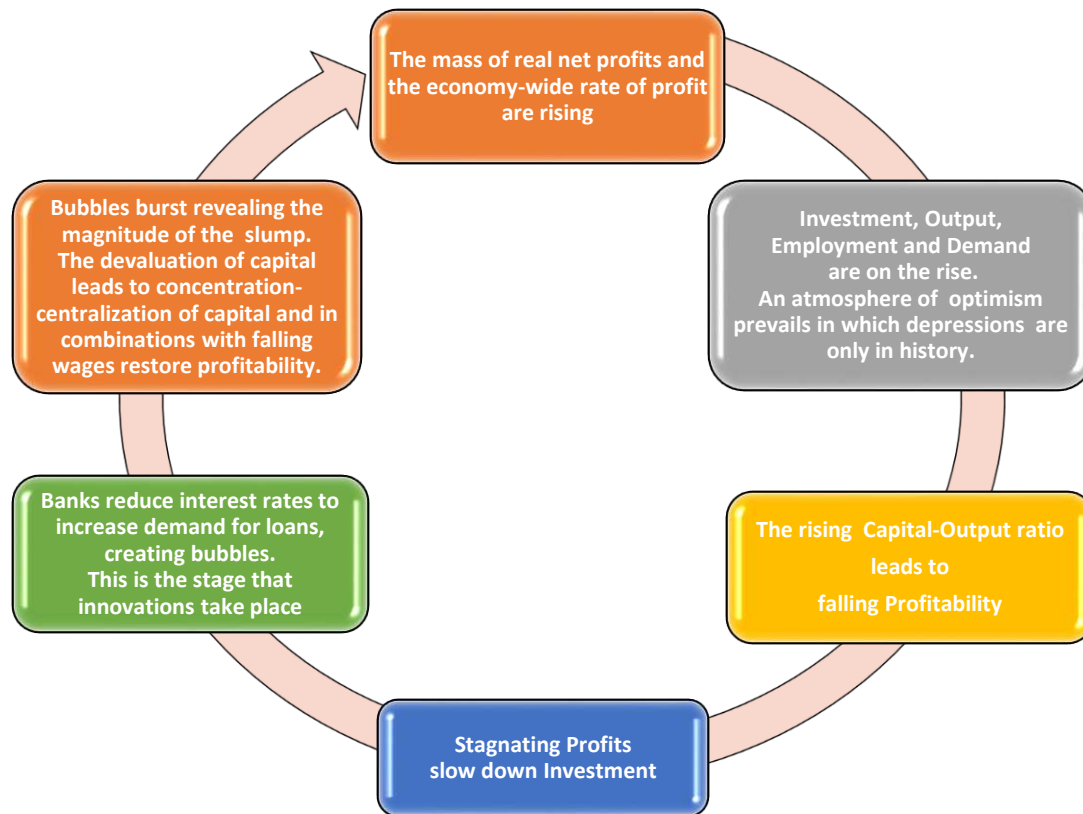


Figure 2: The cyclical movement of key variables

Figure 3 below confirms the tight relationship between the growth rate of the economy and the rate of profit in the data of the US economy for the postwar period. The details of this close relationship between the two variables we explore in the Appendix through the use of an ARDL econometric model.

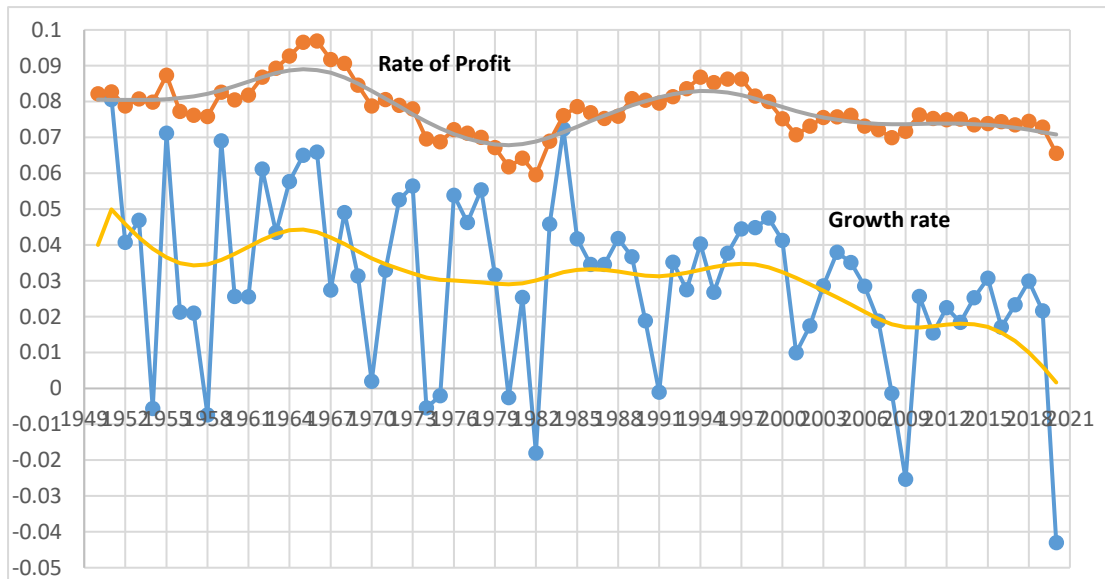


Figure 3: Rate of profit and growth rate, USA 1950-2020 (www.ggdc.net/pwt)⁶

The gap or the ratio between the two variables (growth rate and rate of profit) has received various, in our view complementary, interpretations. The gap may be used as an explanation of the upturn or downturn phases of long cycles (Shaikh 1992; Tsoulfidis and Tsaliki 2019) as well as an indicator of the inflationary pressures (Shaikh 2016), the rising inequalities in income and wealth distribution (Piketty 2015) and the growth of unproductive expenditures in the economy (Tsoulfidis *et al.* 2019).

In short, the burst of the bubbles and the new innovations separate and combined with the rising unemployment and falling wages over long periods make possible the recovery of profitability and form the conditions for the onset of a new long cycle. The innovative investment and the associated ‘creative destruction’ of the capital stock eventually set the stage for the upswing phase of a new long cycle. The inevitable devaluation of capital and the subsequent concentration and centralization of capital along with falling wages restore the economy-wide profit rate and profitability in general. The question is whether this restoration of profitability is going to last to sustain a full long cycle. The answer to this question has to do with the character of the new innovations and the extent to which their destructive effects are “creative” enough to devalue sufficiently the old capital stock compelling the creation of new institutions to corroborate the changes, which would have taken place anyway. Thus, both the Schumpeterian (1942) ‘gale of innovations’ and the epoch-making institutions of the ‘social structures of accumulation’ approach to long cycles (Gordon *et al.* 1987; Kotz and Basu 2019) are both derived from the evolution of the profit rate. In short, they are the outcomes of the movements in the rate of profit and not the cause of the long cycle.

⁶ The time-series data from Penn (Feenstra *et al.* 2015) span the period 1950-2019 (www.ggdc.net/pwt). The growth rate for the year 2020 we got it from the IMF database (www.imf.org). The rate of profit for the year 2020 is from information available at the AMECO database (<https://www.ec.europa.eu>).

4. Real Profits and Long Cycles

The relation between the rate of profit and the growth rate of the US economy is visually confirmed in Figure 3 while, for the shake of space and simplicity, in the Appendix we present the empirical analysis which quantifies this relationship using current econometric techniques. All the results of the empirical analysis provide strong statistical support of the classical political economy hypothesis and argument for the centrality of the rate of profit in determining the economy's growth rate. Having established the connection between the economy's growth rate to the economy-wide average rate of profit, we now look at the hypothesis that the mass of real net profits of the postwar US economy may follow an S-shaped or logistic pattern. To confirm this we use quarterly data on corporate real profits after taxes, capital consumption allowances and inventory valuation adjustments of the total economy.⁷ The quarterly data, spanning the period from 1947:1 until 1982:4 cover the fourth long cycle while the data from 1983:1 to 2020:4 cover the fifth long cycle. We are testing the following form of the logistic regression:

$$\Pi(t) = A + \frac{K - A}{1 + e^{-(at+b)}}$$

where $\Pi(t)$ stands for the dependent variable, that is corporate profits, t is the time variable, A is the lower asymptote of the non-linear regression, K is the upper asymptote of the logistic curve, a is the growth rate and b is the parameter indicating the precise location of the curve.

Table 1: Parameter values of the two logistic curves

Long Cycles	A Lower Asymptote	K Upper Asymptote	a	b	$t_m = \left(-\frac{b}{a}, \frac{K+A}{2}\right)$ Inflection point	R^2
1947:1-1982:4	67.15(8.51)	227.89 (35.32)	-0.050 (6.25)	3.38 (5.82)	1962:3	87.5%
1983:1-2020:4	237.55 (8.24)	2004.51 (33.3)	-0.042 (12.8)	0.923 (13.5)	2005:3	97.1%

The estimated parameters of the two logistic curves are all economically meaningful, as this can be judged by their sign and also magnitude and they are statistically significant (the t -ratios in parentheses). In other words, all of the above features of our estimations paint very accurate descriptions of a well-behaved S-shaped pattern in the movement of real net profits of the US economy. The R -square is pretty high given the statistically strict requirements of the S -shaped curves.

⁷The quarterly data of corporate profits are from the Fred (<https://fred.stlouisfed.org/>) and were accessed on April 21, 2021. These data are deflated by the gross private domestic fixed nonresidential investment deflator index (2012=100) also available from the same source.

In Figure 4, we show the estimated logistic (fitted) curve together with the actual curve formed by the quarterly data of real corporate profits of the USA spanning the period 1947:1 until 1982:4 shown in the upper panel, along with the curves corresponding to the first and second derivatives of the fitted function shown in the lower panel. The inflection point is derived visually (lower panel) through the time rate of change of the logistic curve (or estimated trend). Mathematically speaking, the first derivative of the function, describing the dynamics of the logistic curve, display the upper and lower asymptotes as well as the maximum point while with the second derivative we determine the turning point of the logistic curve which occurs in the middle of its S-shaped trajectory.

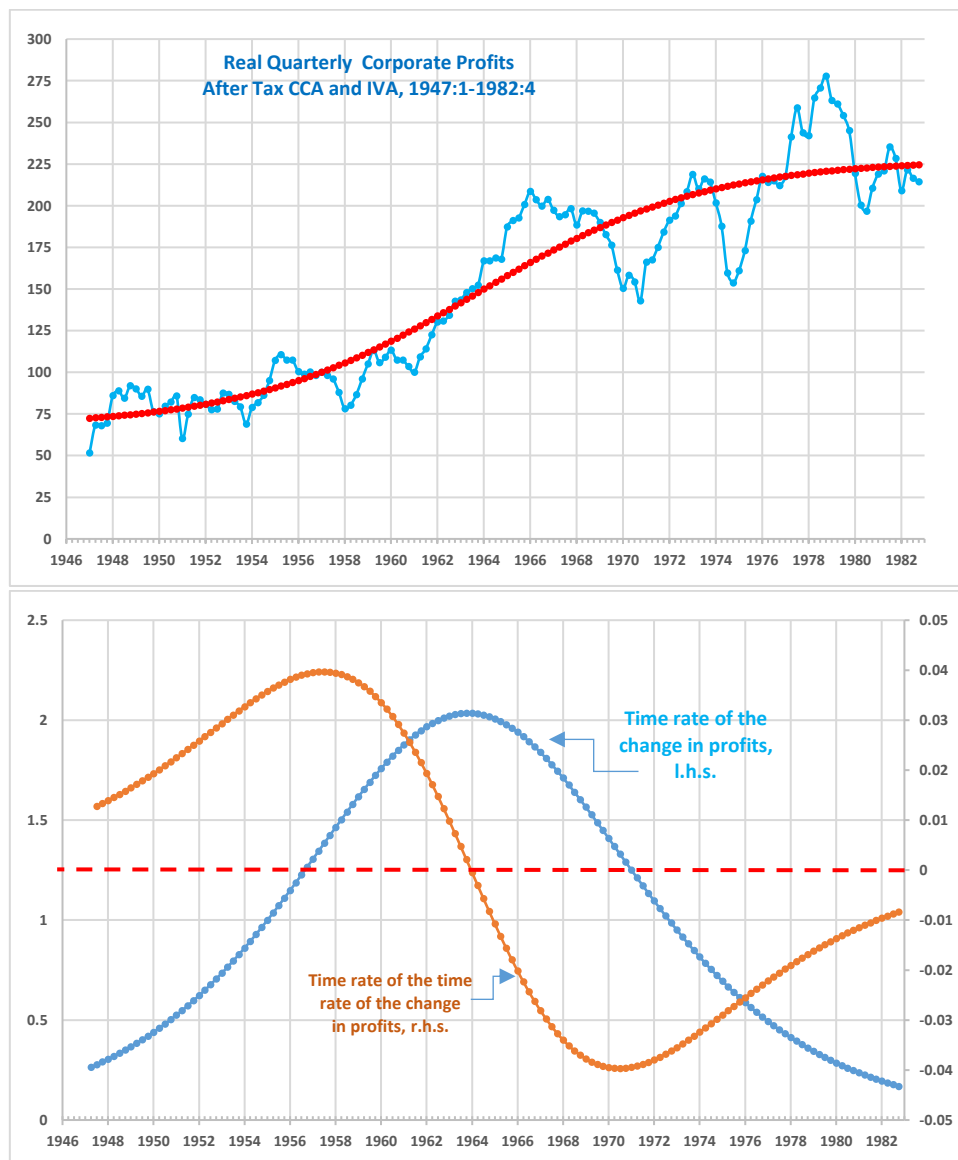


Figure 4: Mass of real net corporate profits, USA, 1947:1 - 1982:4

The mathematical analysis, but also the visual inspection of Figure 4, shows that the inflection point occurs at $t_m = -\frac{3.384}{0.050} = \frac{66.81}{4} = 16.7$ years which added to 1947, we get approximately the year 1963:3. At this point, the first derivative of the logistic curve

is equal to zero while the second derivative from positive becomes negative. By taking the average of the two asymptotes (K and A), we get the profits corresponding to the year 1962:3 which is $\frac{K+A}{2} = 147.52$ billion USD in constant 2012 prices. At the point that the second derivative is zero, the first derivative is maximized while the logistic curve attains its inflection point. From Figure 5, we observe that the US economy already from early 1960s enters into the downturn of the fourth long-cycle which lasted up until the early to mid-1980s. Judging from the shapes of the moves of the first and second derivatives, we can say that the cycle was completed already in 1982:4. More specifically, the bell shape curve of the first derivative (Figure 5, lower panel) indicates that the logistic growth has completed its full trajectory signifying the end of the fourth cycle and the beginning of the fifth on which turns now our attention.

The quarterly data of corporate real net profits spanning the period 1983:1-2020:4 cover the fifth long cycle which is underway towards its end. As a consequence, the non-linear regression results for the fifth long cycle, presented in the lower part of Table 1, are not definitive as those of the fourth long cycle. Figure 5 displays a logistic fit of the quarterly time-series data of real net corporate profits for the period 1983:1-2020:4. In similar to the fourth long cycle fashion, we portray the same figure in the two panels.

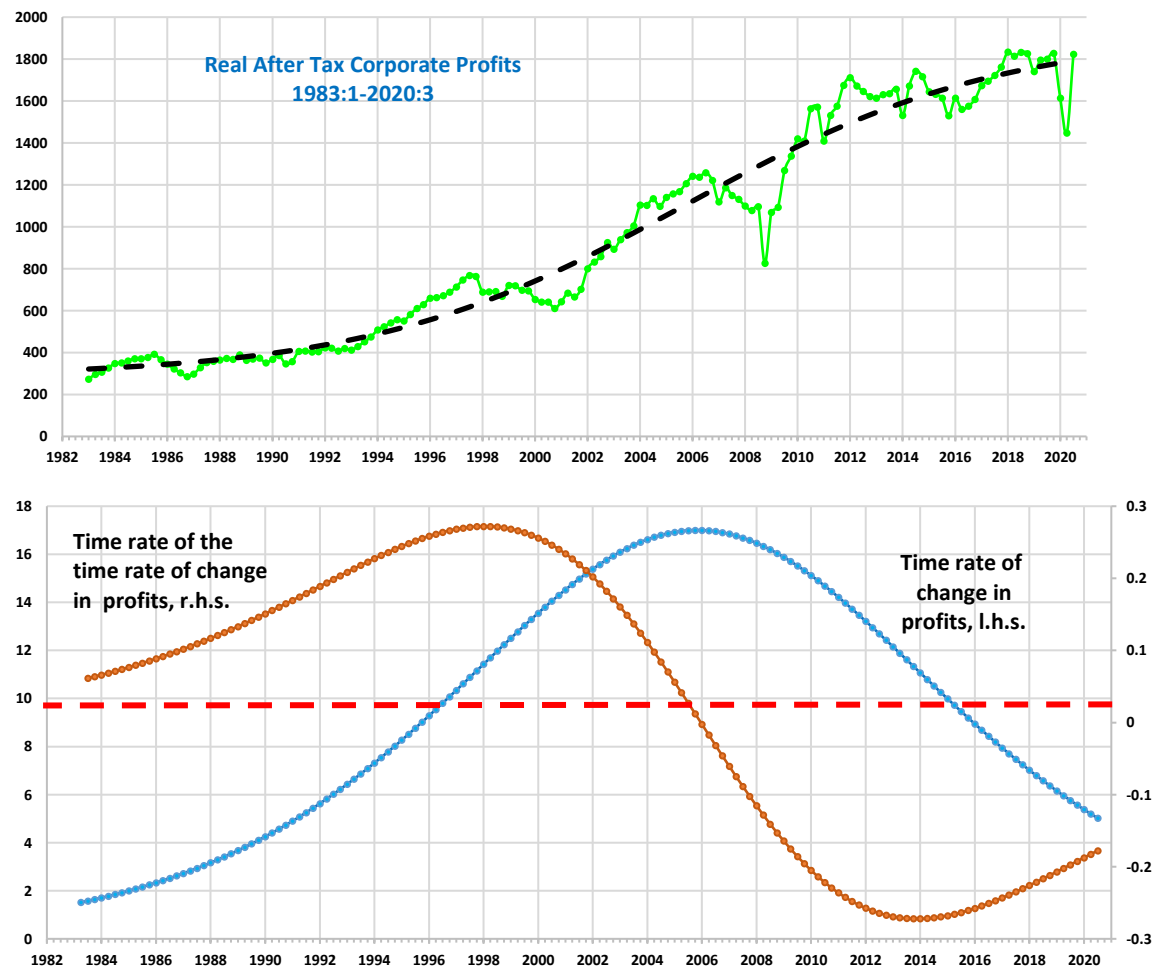


Figure 5: Mass of real net corporate profits, USA, 1983:1 - 2018:2

From the panel of graphs in Figure 5, we observe the fifth long cycle is still underway towards its completion; the approximate estimation of its inflection point gives us a clue of the years remaining to the saturation point. More specifically, judging by the lower panel, we expect the stagnation in profits to continue towards the end of the decade. Notwithstanding, the estimated parameters do not show the exact year of the inflection point. However, judging from the lower panel of Figure 6, we find that the first derivative is maximized in the year 2006:1; that is, in approximately 23 years since 1982 while the attainment of the saturation point will require as many years. The first time derivative of real net profits in the lower panel is not bell-shaped, indicating the cycle is not yet fully completed. The second derivative of real net profits attains its critical point (equal to zero) in the year 2006:1, and the negative part of the curve shows there is still time to approximate the zero bound. Our findings based on logistic curves analysis suggest that the completion of the fifth cycle is anticipated sometime around 2028.

5. Economic Consequences of the Pandemic

The pandemic Covid-19 will be remembered not only for the worst postwar fall in economic activity but also for leveling to the surface pre-existing economic problems and social issues. As is well-known, in the ideology and practice of neoliberalism, the welfare state is thought to be a burden, and its dismantling a precondition for vigorous economic growth. More specifically, the depressionary state of the economy since 2007 and its worsening due to the pandemic revealed weaknesses, such as the inadequacy of social safety nets, lack of trust in institutions, racial, regional, ethnic, and other social conflicts. The neoliberal ideas and economic policies in the face of the pandemic were quickly abandoned, and ironically, even the otherwise neoliberal parties and governments suggested or even implemented expansionary fiscal and monetary policies. The motto “we are all Keynesians now” not only returned but got even lauder, and the rising deficits and debts are considered more like a virtue rather than a vice. The low-interest rates guarantee the servicing of the rising debts, and the expectation is that as soon as the economies find themselves back on their vigorous growth path, the public debt will cease to be a problem.

From the political economy perspective, the pandemic became a catalyst and, at the same time, an accelerator of changes in the workplace and social relations in general; it has contributed to the spread of innovations that otherwise would have taken much longer. The innovations that spread quite rapidly like Zoom, Blackboard collaborate, Microsoft teams, frivolous as they appear at first sight, they meant to stay and spread inducing marked changes in the labor process, the place and manner in which transactions take place, how communications are contacted, and the like. Education has been also affected and the distant learning alternative will certainly remain and, by expanding its applications, will increase its popularity in the near future. The entertainment industry and virtually all aspects of social relations and contacts have already been affected and we are just in the beginning. It is important to reiterate that

these particular innovations are mainly related to telecommunications and have the following major effects that make them attractive from businesses:

- Reduce production costs through the devaluation of capital (fewer building facilities and less space requirements generally reduce operating costs).
- Wages are practically reduced, as the working time at home and intensity of work increases and the lack of comprehensive laws and related institutions may lead to overt workers exploitation.
- Workers may concede to wage reductions as they no longer have workplace-related expenses.

The "choice" of telecommunication-related innovations, when applicable, is forced upon businesses due to cost reduction and so, not only will stay, but further develop and spread accelerating the digital metamorphosis of society. The application of artificial intelligence, machine learning, robotics, and industrial automatization find wide applications and they are supposed to be the innovations that will lead us to what many consider as the popular nowadays 'fourth industrial revolution'.⁹ However, these innovations appear as more destroying rather than creating new stable and well paid jobs. As a consequence, income inequalities are expected to increase, either because these innovations will place many businesses out of the market increasing unemployment or simply because these innovations do not create more jobs than those they destroy. This is particularly true in low-skills employment which can be more easily replaced by automation. Naturally, unemployment will be on the rise, especially in the low skills workers, worsening inequalities in income distribution, the main cause, according to the proponents of the SS thesis, of the lasting stagnating economy. The income distribution data of the US and, in general, of major economies show rising income disparities especially after 2007.¹⁰

In the face of these prospects, there are concerns and discussions about counterbalancing the negative to employment consequences of the specific innovations through the introduction of the universal basic income, UBI, a controversial measure variants of which has been supported, at times, by both conservative and radical economists. Those against the UBI argue that this might be the policy measure through which we are going to have the dissolution of the welfare state as we know it. Furthermore, the UBI is expected to bring a confrontation between the insiders (those in good paying jobs) and the outsiders. Consequently, polarization of society (dual-class societies) is heightened and essentially set the laboring class under the control of big businesses. Nevertheless, the UBI appears to be effective in the case of extreme poverty but it may lead to widening inequalities between social classes.

⁹ Proponents of the 'fourth industrial revolution' in their periodization find an industrial revolution approximately every century starting from the eighteenth century towards the present (Schwab 2017).

¹⁰ The studies by Piketty (2014) and Acemoglu and Restrepo (2017) point to the same direction.

Unlike though the SS thesis, these same phenomena are precisely those expected from the falling profitability, which past a point, leads to rising default rates, increased concentration and centralization of capital and, inevitably, rising unemployment rates, provided that they are appropriately measured (Komlos 2021). The idea is that not all firms can cope with the new requirements. The least competitive firms will either be priced out of the markets (by their more efficient competitors employing capital using and labor-saving technologies) or become the vulnerable targets for takeovers, which are currently on the rise. Of course, there are firms, in the non-contact intensive industries, like pharmaceuticals, couriers, and those on the internet, which go through a very lucrative period. These industries are favored by teleworking and thrived under pandemic conditions. In sharp contrast, the contact-intensive industries (*i.e.*, airlines, tourism, arts, and entertainment but also private universities, and many manufacturing firms) have suffered an unprecedented blow that will place many of them out of the market, unless there is generous government aid. Finally, firms in retailing industry, by reorganizing and utilizing online platforms, struggle to respond to the ever-changing challenges in markets in this new emerging era.

Naturally, there is reorganization everywhere, and soon we will find ourselves in a transformed society and economy, which if left to their own devices, they will give rise to the following:

- Widening of inequalities at both national and regional level
- Spread of capital-using labor-saving technologies
- Increased unemployment and underemployment
- Impoverishment of large sections of the population

As a consequence of these changes, we are witnessing a rapid increase in both private (household and business) and public debt. Rising public debt is of great concern not only for the “usual suspects” (Argentina, Greece, Japan, among many others) but because the list has expanded to include many “above suspicion” countries, such as the USA whose debt is currently around 130%, well above the thresholds of 60% of the EMU, 77% of the World Bank, and 90% suggested by Reinhart and Rogoff (2009).

The projections in the years to come are, in general, optimistic, and they are based on the spread of innovations, which will be accelerated by government intervention. This scenario depends on the effectiveness of vaccination programs and the effective utilization of emergency measures taken by the US government and the developments in the EUs Recovery and Resilience Fund and other countries. In addition,

- There is a discussion for a possible “hair cut” of debt obligations, especially those created during the pandemic, and there are also discussions about various public debt settlements.
- It is now more and more recognized that there can be no national solution and the *de facto* international cooperation will be sought from a perspective of

smoothing out inequalities and daring debt solutions (be it a "hair-cut" or other settlements).

Certainly, the pandemic revealed the limits of the market in general and the private sector in particular to meet the demands of major challenges. However, as we argued, neither the US nor any other from the major economies displayed vigorous growth rates before the pandemic, and nothing so far suggests that the long-term global recession is over. The US and with that the international economy is expected soon to recover to their pre-pandemic anemic growth rates. The current innovations (in our view, the last of the Internet era), although they cause many changes in society; nevertheless, do not promise anything altogether different. However, they have the potential to act as catalysts for the emergence of new so-called 'disruptive innovations' that will give rise to an era, like the internet in the 1980s, the electricity and railroads in the nineteenth century, and steam-engine in the industrial revolution. Such a prospect can only emerge through public funding of basic research and international cooperation; only then there will be the foundations and necessary conditions for a rising phase of a sixth long cycle. Conditions that are hard to be fulfilled at the present or near future times.

6. Summary and Concluding Remarks

The economy since 2007 is in the downturn phase of the fifth long cycle. Our projection based on real corporate net profits of the US economy is that the stagnation will continue after the pandemic, despite the expected rising profitability, which cannot last for long unless major disruptive innovations signify the onset of the sixth long cycle. Hence, the post-COVID-19 economy may not be all that different from its previous settings. The employment prospects in the post-pandemic period are not good enough. The reason is that the new technologies, namely, Artificial Intelligence, Machine Learning, Robotics, and Industrial Automation, admittedly eliminate more jobs than those they create, at least, in the short run. These new technologies increase productivity and reduce costs and, therefore, increase profits, but cause unemployment. Under these circumstances and with these new technologies, if the economy is left to its own devices, the future of work will be gloomy. This is the reason why governments must intervene at both national and international levels (in cooperation with international organizations) to create the institutional panoply to secure employment and somehow guarantee enough income for dissent leaving. The current emergency financial assistance programs can be thought of as a first-rate testing procedure for the future application of the much-discussed controversial UBI.

During the current pandemic, it is generally acknowledged, that the private sector and the market, both so much praised during the decades of neoliberalism, have been more part of the problem rather than its solution. By contrast, the suppressed public sector surprisingly enough contributed a great deal to provide answers to the urgent economic and social problems. For example, progress in vaccination and medication was the result of public funding and cooperation among international institutions, universities,

and research centers across the globe. These developments show that more attention should be directed to the role of the public and international cooperation on many interrelated issues. Finally, the pandemic has shown that the public sector is crucial in tackling critical issues, starting from public health, moving to the environment, strengthening basic research, and confronting other vital issues, like national and regional disparities.

From our discussion it follows that the material conditions after the pandemic are the same as before and the economies soon will return to their previous anemic growth rates. The moderate increase in the rate of profit and the real net profits are not enough to encourage net investment and initiate the onset of new long cycle. Government's expansionary policies certainly ameliorate the negative effects of the pandemic, and at the same time may provide directions to firms and financial institutions towards designating investment activities. Having the experience of Covid-19 being the result of increasing commodification and environmental destruction, governments and international organizations should be particularly careful with the kind of activities they encourage with their actions or inactions.

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Appendix: The econometrics of the profit - growth rates relationship

Having established the theoretical relationship between profit and growth rates, the next step is to quantify their relationship using popular and, at the same time, efficient econometric technique. To this end we specify the following VAR model with the rate of profit and the growth rate of the US economy. Judging from the distribution of eigenvalues of our bivariate VAR model, we observe in Figure A1 that both lie inside the unit circle indicating the stability of our simple bivariate model.

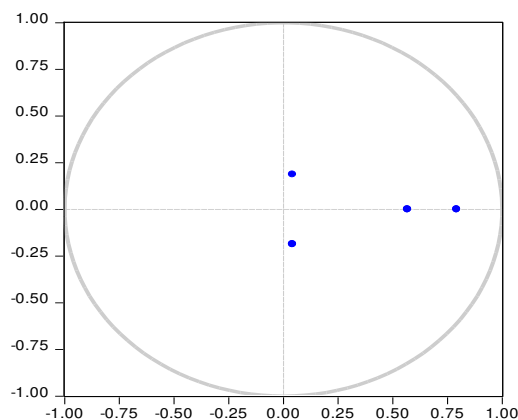


Figure A1: Inverse of AR Characteristic Polynomial

The distribution of eigenvalues shown in Figure A1 indicates that our VAR model is well specified. The variables profit rate, r , and growth rate, g , are I(1) and I(0), respectively; thus, the appropriate testing method for the presence of possible causal relationship between them is the Toda-Yamamoto (TY) causality test. The results of the analysis are reported in Table A1.

Table A.1: Pairwise Granger Causality Tests, with two lags, USA, 1948-2017

VAR Granger Causality/Block Exogeneity Wald Tests, 1950-2021			
Dependent variable: g			
Excluded	Chi-square	Df	Probability
r	8.19	2	0.0166
All	8.19	2	0.0166
Dependent variable: r			
Excluded	Chi-square	Df	Probability
g	31.72	2	0.000
All	31.72	2	0.000

The results reported in Table A.1 suggest that the null hypothesis that the growth rate does not Granger Cause the rate of profit is certainly rejected; and the same is also true for the rate of profit although with not the same certainty. Thus, we conclude the bidirectional causality between the two variables.

The simple TY Granger causality results encourage the use of an ARDL model in which we include only the two variables, g and r , precisely because we want to test in a pure and straightforward way the strength of the dependence of the growth rate on the rate of profit. For the application of the ARDL model, we need to ensure that at least one of the two variables is I(1). As we pointed out the rate of profit after many tests is shown to be an I(1) variable, after all we are testing the law of the tendentially falling rate of profit. However, we cannot say the same with the growth rate of real GDP, since real GDP is an I(1) variable and its growth rate is expected to be stationary; in fact this is what most tests have shown, a result rather expected by the SS hypothesis. The econometric analysis suggested the ARDL model with one lag in both the growth rate and the rate of profit as the best ARDL model whose results along with those of the bound tests are presented in Table 10.2 below.

Table A.2: ARDL (1,1) Long Run Form and Bounds Test

Case 1: Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
c	-0.046460	0.022425	-2.071812	0.0423
$g(-1)^*$	-0.598230	0.114690	-5.216054	0.0000
$r(-1)$	0.829997	0.307378	2.700248	0.0088
$\Delta(r)$	4.752168	0.594769	7.989938	0.0000
* p-value incompatible with t-Bounds distribution.				
Case 1: Levels Equation: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
r	1.387421	0.443692	3.126990	0.0026
c	-0.077663	0.034668	-2.240205	0.0285
EC = $g - (0.8231 * r - 0.0202)$				
F-BoundsTest		Null Hypothesis: No levels relationship		
TestStatistic	Value	Signif.	I(0)	I(1)
F-statistic	9.078247	10%	3.02	3.51
k	1	5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58

The bound test results indicate cointegration of the two variables at the 1% level of significance and furthermore the two variables are directly related. The results with the error correction are presented in Table A.3 where we observe that the error correction term is statistically significant and equal to -0.598 indicating that any deviations from the equilibrium are restored quite fast back to the long run relationship.

Table A.3: ARDL Error Correction Model

ECM Regression				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Δr	4.752168	0.573388	8.287882	0.0000
CointEq(-1)*	-0.598230	0.112908	-5.298371	0.0000
R-squared	0.713999	Mean dependent var		-0.001791
Adjusted R-squared	0.709730	S.D. dependent var		0.028991
S.E. of regression	0.015619	Akaike info criterion		-5.452076
Sum squared resid	0.016345	Schwarz criterion		-5.387319
Log likelihood	190.0966	Hannan-Quinn criter.		-5.426385
Durbin-Watsonstat	1.783889			

The ARDL results displayed in Tables A.2 and A.3 further suggest that the short-run effects of the rate of profit are stronger than the long run effects as this is derived by the short-run coefficient $\Delta r = 4.75 > r = 0.829$. Finally, the ARDL results are robust as this can be judged by the CUSUM and CUSUMSQ tests, displayed on the l.h.s. panel and on the r.h.s. panel of Figure A.2, respectively.

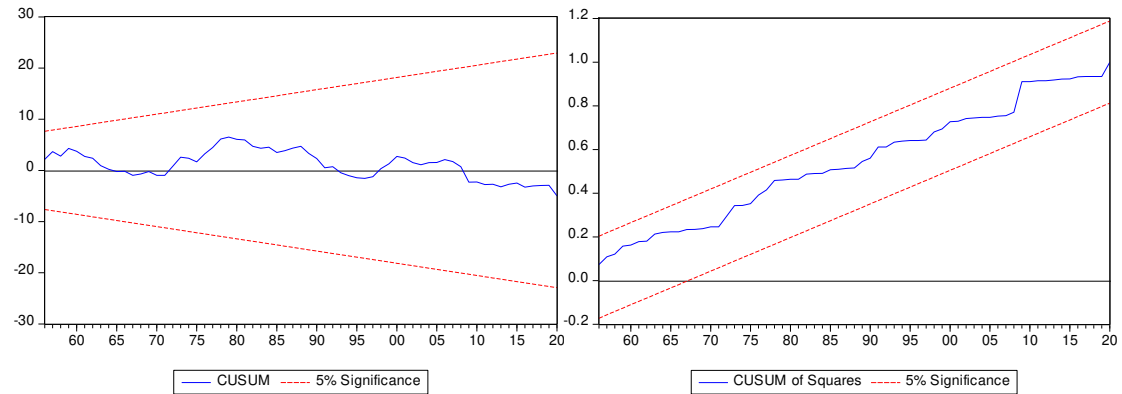


Figure A.2: CUSUM and CUSUMSQ tests

In Figure A.2, we observe that the plot of the CUSUM test is within the criteria boundaries and the same is true for the CUSUMQ approaches, both found within the 5% bounds indicating that our model is stable. Hence, once again the classical political economy hypothesis and argument for the centrality of the rate of profit in determining the economy's growth rate also finds strong statistical support.