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The growth paradigm and the failures of the alternatives within the system: notes towards a dystopian Marxism

Rodrigo R. Gómez Garza

Universidad Nacional Autónoma de México (UNAM), México

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Rodrigo R. Gómez Garza [1]

The growth paradigm and the failures of the alternatives within the system: notes towards a dystopian Marxism

Abstract. We start with two main hypotheses: a) the tendency to overproduction and expanded reproduction is inevitable in a context of production based on competition and the search for profit; b) conflicts for resources and the tendential degradation of the quality of life are also inevitable and are only going to worsen as the expanded reproduction takes its toll on the environment and on the material conditions for the reproduction of capital. This paper explores some underlying phenomena to support these claims, such as the Jevons Paradox, the Tendency of the Rate of Profit to Fall, and the Energy Return on Investment. Finally, it discusses the failure of some of the alternatives to the Growth Paradigm: Sustainable Development, Green Growth, Circular Economy and Degrowth.

Keywords: Overproduction, Autopoiesis, Jevons Paradox, Rate of Profit, Dystopian Marxism.

Resumen. Partimos de dos hipótesis principales: a) la tendencia a la sobreproducción y a la reproducción ampliada es inevitable en un contexto de producción basado en la competencia y la búsqueda de ganancia; b) conflictos por recursos y la degradación tendencial de la calidad de vida también son inevitables y sólo empeorarán mientras la reproducción ampliada impacte sobre el medio ambiente y sobre las condiciones materiales para la reproducción del capital. Este trabajo explora algunos fenómenos subyacentes que apoyan estas afirmaciones, como la Paradoja de Jevons, la Tendencia Descendente de la Tasa de Ganancia y

[1] Rodrigo R. Gómez Garza is a postdoctoral researcher from Centro Regional de Investigaciones Multidisciplinarias (CRIM-UNAM). Member of the National System of Researchers (SNII), Level I. Tutored by Dr. José Raúl García Barrios. This work was supported by UNAM postdoctoral program (POSDOC). ORCID: https://orcid.org/0009-0002-7454-0352

la Tasa de Retorno Energético. Finalmente, discute el fracaso de algunas de las alternativas al Paradigma del Crecimiento: el Desarrollo Sustentable, el Crecimiento Verde, la Economía Circular y el Decrecimiento.

Palabras clave: sobreproducción, autopoiesis, paradoja de Jevons, tasa de ganancia, marxismo distópico.

Introduction

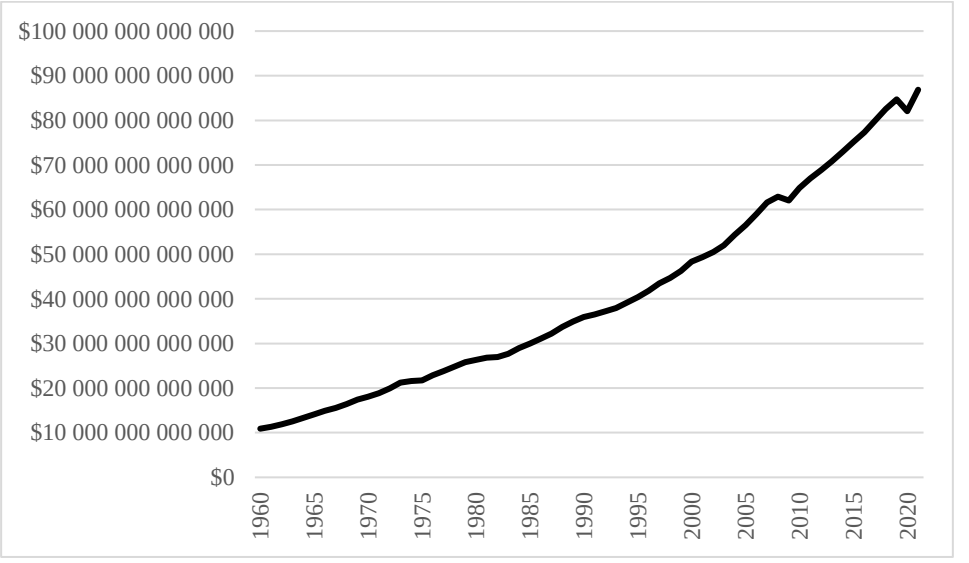
The first hypothesis is that the tendency to overproduction and expanded reproduction is inevitable in a context of production based on competition and the search for profit, such as the one that has ruled the world-economy for centuries. Historically, competition between capitals forces technological improvements that cause a fall in production costs and in the prices of commodities, which triggers phenomena such as the Jevons Paradox or the Tendency of the Rate of Profit to Fall, where capitals are forced to compensate for the drop in the mass of profit per individual commodity and in the percentages of profit by constantly increasing the scale of production to extract a bigger absolute mass of profit. In this regard, the second hypothesis is that the struggle for resources and territories is also inevitable given the continuous expansion of capitalist production. If we accept these two hypotheses, we must accept two facts: 1) that an ecological collapse is inevitable, and that capitalism can't reform itself to be 'greener' or 'sustainable'; 2) conflicts and wars for resources and territories are only going to worsen in extensive and intensive terms as the material conditions for the reproduction of capital are undermined.

To prove these claims, we first present a section that explains the growth paradigm that has permeated capitalism since its rise to the hegemonic mode of production in the world-economy after the Industrial Revolution. Growth is inherent to capitalism and is structurally impossible a 'type' of capitalism that does not try to grow or a stationary state capitalist economy, the data from the last two centuries supports this premise. In another section we discuss three phenomena that explain, at least in part, the underlying structure of this constant growth, namely: a) the Jevons Paradox; b) the Tendency of the Rate of Profit to Fall; c) the Energy Return on Investment. To further develop the argument, we go into a section that discusses the inevitable failure of the most serious 'alternatives' to the current world-economy's growth model: a) Sustainable Development, b) Green Growth, c) Circular Economy, d) Degrowth. Given this premises the possibilities of either a utopian reality that can free us or a capitalist system that can still function for centuries to come are rather slim. The bigger possibility in play is the collapse of the modern civilization as we know it. Thus, in the last section of this paper, in

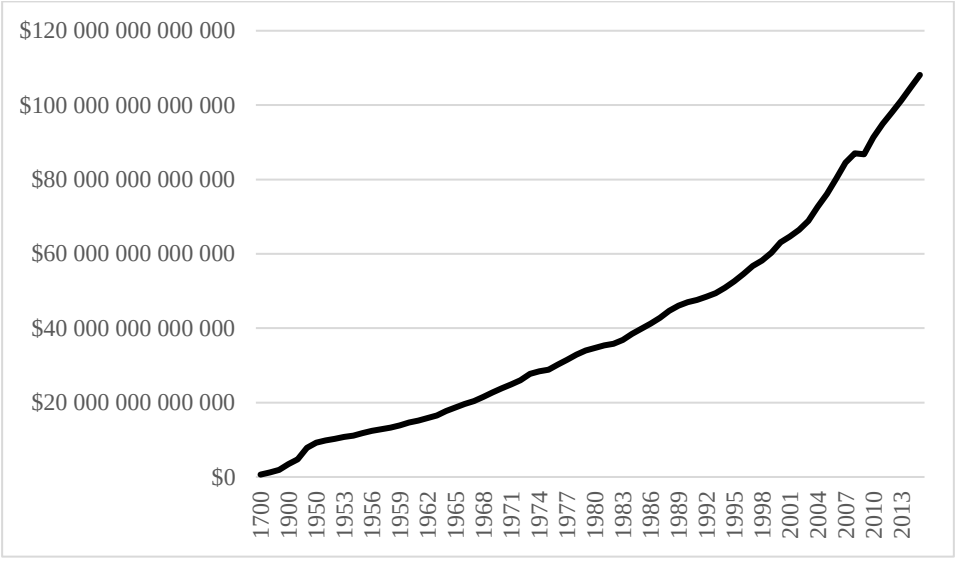
the conclusions, an argument will be made to embrace a scientific dystopian thought to better explain the times to come.

The growth paradigm and the great acceleration

From 1960 to 2021 the economy has grown around eight times in size (see graph 1), but to give more context we can mention that from the early 1800s to 2015 the economy grew around a hundred-fold (see graph 2), which means that a 1% growth in 2015 would be roughly equal to the total size of the economy at the beginning of the 19th century. If seen in relative terms growth appears to be slowing down, but in absolute terms each new percentage point of growth is considerably larger with each passing year, we can clearly see that a 1% growth in the world-economy in 1820 is not the same as a 1% growth in 2020, it is several orders of magnitude bigger.



Graph 1. World Gross Domestic Product, 1960-2021 (constant 2015 US$). Source: made by the author with data from The World Bank and the Organisation for Economic Co-operation and Development [OECD] (2023).



Graph 2. World GDP. Total output of the world economy; adjusted for inflation and expressed in international $ in 2011 prices. Source: made by the author with data from Roser (2017).

We can also see this in play in the long run by looking at the growth in per capita GDP over the last two centuries (see table 1), where the world's real GDP per capita grew approximately 14 times with most of the growth occurring after the 1950s. A quick look at the Maddison Project Databases will show that for most of human history economic growth wasn't a widespread phenomenon and that an exponential growth has occurred just very recently in terms of human history.

Real GDP per capita in 2011$

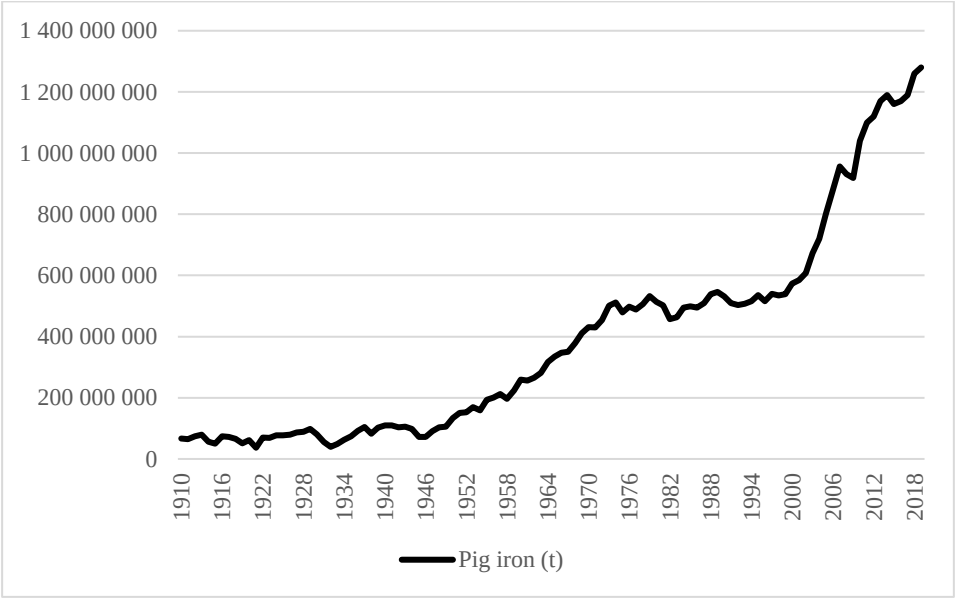
Year	Western Offshoots*	World
1820	$2,513.05	$1,101.57
1850	$3,474.41	$1,225.08
1870	$4,647.45	$1,497.98
1900	$7,740.85	$2,212.04

Real GDP per capita in 2011$

Year	Western Offshoots*	World
1920	$9,741.42	$2,241.17
1940	$11,620.50	$3,133.20
1950	$14,773.22	$3,350.57
1960	$17,471.51	$4,385.79
1970	$23,209.65	$5,951.55
1980	$28,786.76	$7,232.97
1990	$35,619.38	$8,222.48
2000	$44,329.27	$9,914.57
2010	$48,090.15	$13,179.50
2016	$51,667.98	$14,700.37
2017	$52,597.22	$14,944.09
2018	$53,756.50	$15,212.42

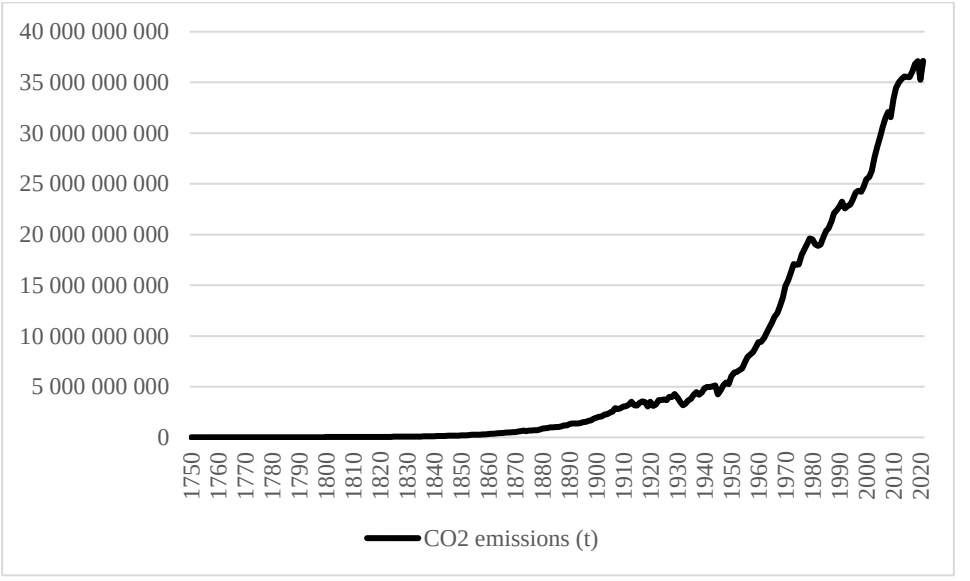
Table 1. Real Gross Domestic Product per capita in 2011$, 1820-2018. Source: made by the author with data from the Maddison Project Database (2020). *United States, Canada, Australia, and New Zealand.

And if we see the rate at which production has been growing the numbers are staggering. We can look at the data for some of the most relevant socio-economic indicators, for instance the global production of pig iron (see graph 2) between 1910 and 2019 grew almost 20 times and it is still on the rise. Yet again we can see that an exponential jump took place around the 1950s.



Graph 3. World pig iron production in metric tons, 1910-2019. Source: made by the author with data from the U.S. Geological Survey (2022).

This phenomenon that occurs around the 1950s is what has been called 'The Great Acceleration', since we can also see the same trend in almost all major indicators of the world-economy happening at the same time, from socio-economic indicators such as population, real GDP, or energy use, to Earth system trends such as Green House Gases (GHG) emissions, ocean acidification, biosphere degradation, or tropical forest loss (Steffen, 2015).



Graph 4. Global CO2 emissions (tons), 1750-2021. Source: made by the author with data from the Global Carbon Project (2022).

If we look closer to the growth of some of these indicators we can appreciate that if we limit ourselves to see the picture in terms of percentages, as is often the case with economists, it may seem that year to year growth is not that big, and some of these economists may even consider it a problem since there are periods where growth seems to be slowing down or even falling (see table 2); and slow growth seems to be an economist's worst nightmare. But if we look at the bigger picture and think in absolute terms (e.g., tons of crude steel), it becomes apparent that growth over the last two centuries has not stopped, it has an exponential upwards trajectory that must sometime come to an end if we are to believe that we live in a finite world.

World crude steel production, 1950-2021							
Year	Million tons	Year	Million tons	Year	Million tons	Average growth rates %	
1950	189	**2000**	850	**2011**	1540	**1950-55**	7.4%
1955	270	**2001**	852	**2012**	1562	**1955-60**	5.1%
1960	347	**2002**	905	**2013**	1652	**1960-65**	5.6%
1965	456	**2003**	971	**2014**	1674	**1965-70**	5.5%
1970	595	**2004**	1063	**2015**	1623	**1970-75**	1.6%
1975	644	**2005**	1148	**2016**	1632	**1975-80**	2.2%
1980	717	**2006**	1250	**2017**	1735	**1980-85**	0.1%
1985	719	**2007**	1350	**2018**	1827	**1985-90**	1.4%
1990	770	**2008**	1345	**2019**	1875	**1990-95**	-0.5%
1995	753	**2009**	1241	**2020**	1879	**1995-00**	2.5%
		2010	1435	**2021**	1951	**2000-05**	6.2%
						2005-10	4.6%
						2010-15	2.5%
						2015-20	3.0%
						2020-21	3.8%

Table 2. World crude steel production, 1950-2021. Source: made by the author with data from the World Steel Association (2022).

This type of growth, that is very recent in terms of human history, seems to be uncontrollable, and the underlying structure of this system seems to be unstoppable and spiraling out of control. It's as if the system has become independent of conscious human decisions and has gone fully autopoietic leading us to an inevitable collapse. In the next section we will explore certain phenomena that explain this autopoiesis.

Destructive autopoiesis: Jevons Paradox and the tendency of the rate of profit to fall

The Jevons Paradox

The approach of perspectives such as the one from Sustainable Development and that of Degrowth theorists tend to focus on the search for technological improvements that would allow to reduce the use of resources and thereby to reduce the rate of environmental destruction and the conflict surrounding the fight for said resources. However, historically the more efficient the use of resources and the more it would be viable to reduce their use the more their consumption increases. This phenomenon, that has been recorded since at

least the 19th century, is known as the ‘Jevons Paradox’ (Jevons, 1906, pp. 140-142), or as the "rebound effect" by conventional economics (Saunders, 1992), and describes the way in which as the improvement in production processes and technological innovation makes the use of some resource more efficient, in absolute terms the use of said resource increases instead of decreasing. The fall in production prices derived from productive improvements under a context of competition between capitals motivates capitalists to produce more, to expand the scale of production under better conditions of competition. The existence of this phenomenon jeopardizes the premise of conventional economics that postulates that improvements in productive efficiency, technological development and the search for new raw materials are the keys to a sustainable world; in fact, historically it has been the opposite, each new improvement opens a new market for the accumulation of capital.

This paradox applies to practically all productive spheres in the long term, including those that are supposedly ‘sustainable’, a paradigmatic case would be that of sustainable agriculture that promotes intensive agriculture as opposed to an expansive one, that is, it proposes to increase production per hectare to avoid expansion to virgin lands; under capitalist dynamics, agricultural production improvements paradoxically result in greater expansion and greater deforestation, as can be seen in the case of several South American countries at least for 4 decades, where the “Jevons Paradox exists even for moderate levels of agricultural productivity, leading to an overall expansion of agricultural area” (Ceddia, 2013, p. 1052). And we can see the Paradox in play all over the world in all sorts of industries, for example we can mention studies for specific countries or regions like in the United Kingdom regarding private road transport (Freeman, 2015) or energy demand in Scotland (Hanley, 2009), and the Jevons Paradox existing at the macro level for all major economic regions of the world across decades (Polimeni & Polimeni, 2006; Alcott, 2007).

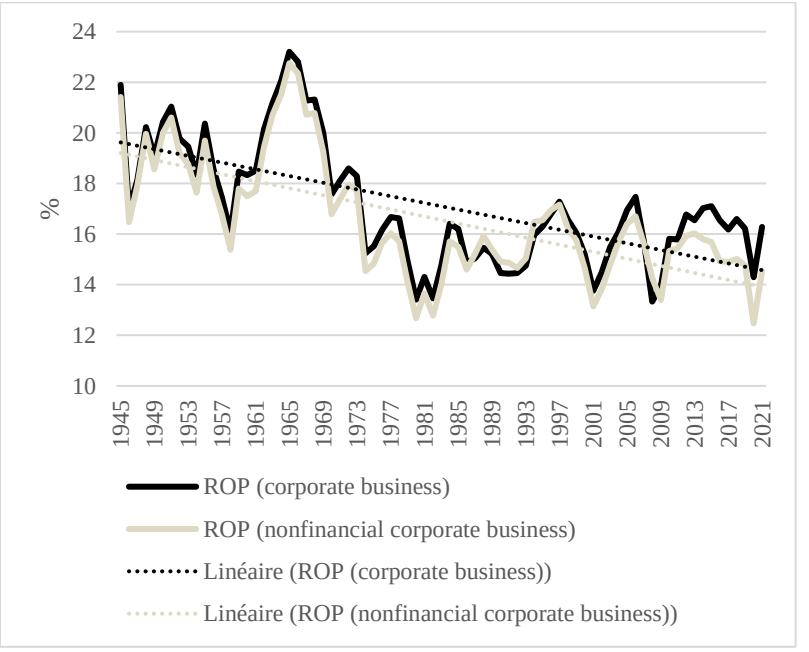
Just to mention a few more recent studies, we discover that in 37 countries that are part of the Organisation for Economic Co-operation and Development (OECD), the Jevons Paradox has been in play at least from 1990 to 2020 (Yu et al., 2022). We can say the same about the iron and steel industry in China from 1995-2017 (Wang et al., 2022) and across sectors in India from the 1980s to 2017, where the “magnitude of energy intensity effect is stronger in the agricultural sector than the other sectors” (Murugasamy & Mishra, 2022, p. 112). The Paradox is in play, but most of these recent studies still believe that more energy efficiency will ultimately be the long-term solution, not considering that efficiency can’t improve forever, there are natural boundaries to efficiency and the transition to renewable clean energies is not likely to improve efficiency at a world-economy scale, as we will see in another section. And while “the evidence in favour of ‘Jevons Paradox’ is far from conclusive, it does suggest that economy-wide

rebound effects are larger than is conventionally assumed and that energy plays a more important role in driving productivity improvements and economic growth" (Sorrell, 2009, p. 1456).

The Tendency of the Rate of Profit to Fall

Competition and technological innovation motivated by it is what is at the base of this need for constant and blind production, this is because the more efficient the production processes are, the easier it is to produce goods through the intensive use of machinery, which displaces the use of labor force in relative terms: with a downward pressure over the price of commodities and a bigger capital intensity the capitalist profit margin per individual commodity is reduced, which is why it is necessary to increase the scale of production to compensate with mass of profit the fall in the rate of profit. In general terms, this is what the Law of the Tendential Fall in the Rate of Profit describes, as explained by Karl Marx, using the simple formula of dividing surplus value over the total advanced capital (Marx, 1993 [1894]).

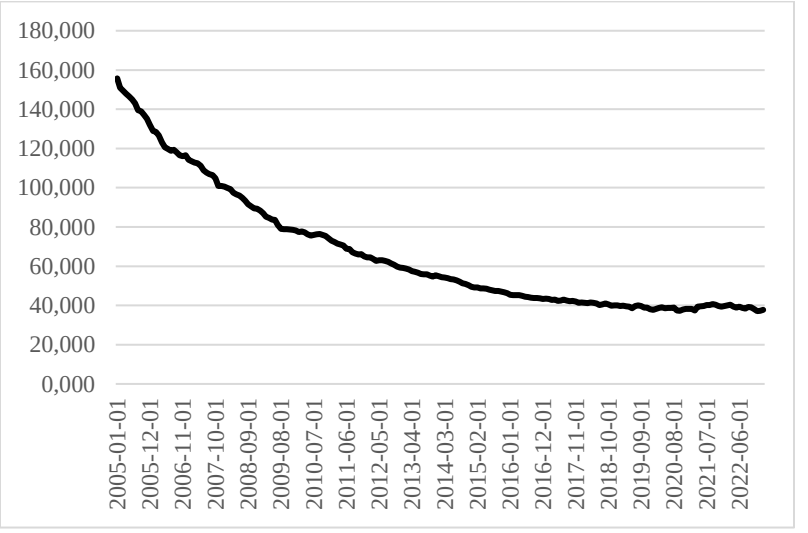
It is only relatively recently, perhaps over the last 15 years, that the evidence for a secular falling rate of profit has been widely available and has gained more academic interest, just to name a few the works by Shaikh (2016), Carchedi & Roberts (2018), Kliman (2011), Roberts (2016), Duménil & Levy (2012), Kotz (2008), Maito (2013), and Minqi *et al*. (2007), have proven the existence of a tendential fall in the rate of profit in the long run for the whole world-economy at least since the 19th century. Analyzing the literature on the matter it can be appreciated in a very suggestive way that the tendency of the rate of profit to fall is maintained regardless of the type of measurement that is carried out, if it is before or after taxes, with or without inventories, whether or not it includes the financial sector or if the figures are adjusted to historical prices or real prices. It can also be seen that there are "waves" in the behavior of the rate of profit in the long term, where capital tries to counteract the fall in the profit rate by applying the recipes already analyzed by Marx (1993 [1894]), especially by reducing real wages during the last wave of capitalist expansion, during what is now known as the neoliberal era. The falling rate of profit manages to be temporarily offset, but as Marx explains it, the "trend" is maintained and with each long wave of capitalist development returning to the levels of profitability known by early capitalism seems an impossible task. In this regard, we can see that the rate of profit of the most developed economy on the planet fails to be restored to its 1940s or even 1960s levels (see graph 5).



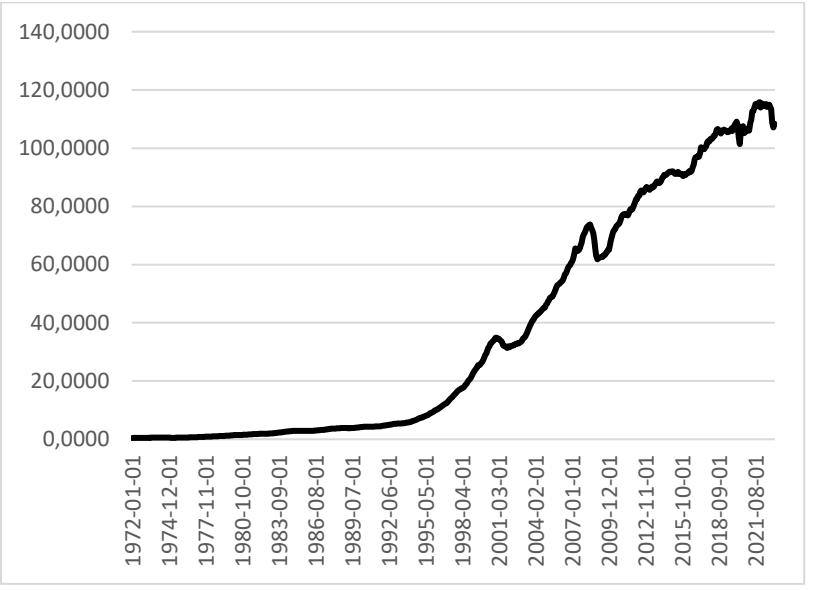
Graph 5. Rates of Profit of the corporate and non-financial corporate sectors of the United States (1945-2021). ROP= 100 * [(Net value added - compensation of employee) / Net stock of nonresidential fixes assets at replacement cost]. Source: made by the author with data from Wasner & Basu (2023).

The previously described phenomenon can be observed practically in any economic sphere that depends on the intensive use of machinery. A paradigmatic example would be the production of computer equipment and electronic products, as can be seen in Graph 6 the price for these types of goods has been steadily decreasing, and, at the same time, as can be seen in Graph 7, the number of products manufactured and launched on the market has not stopped increasing exponentially. Cheaper products need larger scales of production to compensate the reduction of the rate of profit with absolute mass of profit, as David Harvey would put it:

> […] if the mass of value in certain hands is already huge, then that mass may continue to expand with potentially monstruous consequences, environmental as well as social, even though the rate of profit is falling […] Out of this contradiction arises the pressure to create and grow the world market while putting more and more stress on the metabolic relation to nature. (Harvey, 2021, pp. 79-80)



Graph 6. Consumer Price Index for All Urban Consumers: Computers, Peripherals, and Smart Home Assistants in U.S. City Average, Index Dec 2007=100, Monthly Seasonally Adjusted (January 2005-February 2023). Source: made by author with data from the U.S. Bureau of Labor Statistics (2023).



Graph 7. Industrial Production: Manufacturing: Durable Goods: Computer and Electronic Product (NAICS=34), Index 2017=100, Monthly, Seasonally Adjusted (January 1972-February 2023). Source: made by the author with data from the Board of Governors of the Federal Reserve System of the United States (2023).

And there are additional elements to consider when discussing the tendential fall of the rate of profit, for instance, what Immanuel Wallerstein describes as the three main drivers for this tendential fall: a) the long term increase of real wages as the world-economy grows closer to the total proletarianization of the planet; b) the rise in the cost of raw materials for production; c) the secular rise in taxation (Wallerstein, 2004). And we should also consider that in Wallerstein's perspective the secular rise in taxation goes hand in hand with the increasing costs needed to repair or maintain the environment as capitalist production destroys it, long gone are the days when the destruction of the environment was cast aside simply as part of the so-called "negative externalities", if the world-economy intends to flourish and persist it needs to increase its expending to repair the damage done to its material foundations. And the costs are plenty and constantly rising, not only due to the direct damage that we have done and that we need to take care of (like deforestation or the millions of tons of plastic in the oceans), but also due to increasing climate disasters that derive from global warming (like hurricanes or forest fires). In this regard, we can mention, just as an example, that in 2022 there were 18 climate events in the United States that generated losses for more than one billion dollars, and the frequency of this type of events is increasing yearly, the annual average between 1980-2022 was of 7.9 events (CPI-adjusted) while the

annual average of the 2018-2022 period was 17.8 events (NOAA National Centers for Environmental Information [NCEI], 2023).

The Energy Return on Investment

One of the main issues faced by the capitalist reproduction process is the capacity of the available energy sources to boost production at scales appropriate to the valorization needs of the system. Oil has been the soul of the capitalist economy for nearly two centuries and is the main cause of the rapid capitalist expansion around the world, however all good things come to an end and unfortunately (for capital) hydrocarbons begin to reach its productive limits. The problem is that not all energy alternatives that are on the horizon have the same energy capacity as hydrocarbons. The "energy capacity" of each type of resource is usually measured using the Energy Return on Energy Invested (EROEI), which is calculated by dividing the energy obtained in the exploitation of a resource over the energy consumed in the production or extraction of said resource:

$$EROEI = \frac{obtained\ energy}{energy\ invested}$$

Which means that if a barrel of oil generates (in a hypothetical case) 40 J of energy when exploited but 20 J were needed to produce it, the energy return rate would be 2, for each unit invested you obtain double what was used in its production; this would be expressed as an EROEI of 2:1. Also, it is worth mentioning that there is also the Net Energy Gain (NEG) approach, which does not use a rate of return, instead it refers to the real amount of total energy obtained once the expense in producing it has been deducted:

$$NEG = obtained\ energy - energy\ invested$$

We could say that the EROEI approach focuses on the efficiency of an energy source, it is a rate, so it allows us to understand the problem in relative terms or proportions. The NEG, for its part, allows an analysis in which the energy obtained is evaluated in absolute terms to discern the viability or convenience of dedicating effort to obtaining an energy that in relative terms does not seem to be very convenient. Both approaches are not in conflict when carrying out an analysis, and although in this section we will focus on the EROEI considering the NEG approach is useful for an in-depth analysis of chains of production (Arodudu et al., 2013). The NEG approach has its limitations, given that in a scenario where the problem is the relentless growth of production thinking about the viability of an energy source that is not very efficient but that in terms of mass is very abundant or thinking that low efficiency can be compensated with production on

larger scales does not sound very healthy in terms of caring for the biosphere or equitable distribution of wealth.

Furthermore, there is a type of EROEI measurement that accounts for the minimum level of energy efficiency required for a modern society to function properly. If, for example, the main energy source of a hypothetical society had an EROEI of 1:1, it would mean that the energy that its resources provide is the same as what it costs to produce them, so this hypothetical society could not allocate energy resources to any other productive activity, it would be production for the sake of production, like extracting oil just to stare at it because doing anything more would imply a negative energy return on investment. Thus, if we want to have a fully working society and strive for better standards of living, we cannot settle for low EROEIs, the lower the EROEI the higher the sacrifices we need to make as a society (e.g. social security or education) (Hall, 2017, p. 154).

Thus, there is a minimum EROEI that allows society to perform as a society. According to Weißbach et al. (2013) the minimum 'economic threshold' for a society to function would be based on an EROEI of 7:1, so all Energy sources that have an EROEI lower than that are simply not viable for reproducing the most basic needs of a modern industrial society. This threshold would rule out the viability of all biofuels and of many technologies based on solar and wind power. But the threshold given by the research of Weißbach and his colleagues only accounts for the minimum necessary to boost an industrial society at a basic economic level, however no developed or developing nation functions in reality with such a reduced EROEI, a 2014 research that compares human development indices with the energy return rates of several countries concluded that "countries with an $EROI_{soc}$ of less than 15-25:1 and/or less than 100 GJ per capita per year tend to have a poor to moderate "quality of life"" (Lambert et al., 2014, p. 164). According to Fizaine et al. (2016) the United States needs a minimum societal EROEI of 11:1 to continue with positive economic growth rates, but in reality, USA has an EROI of around 40:1 across all generating technologies (World Nuclear Association 2020) and its current production levels depend on maintaining that standard.

The attention paid to the relevance of energy seems to be a relatively recent topic, during most of capitalist history, easily extracted, cheap and abundant fossil energy seemed to be unlimited, so the reflection on the need to transition to other energetics has not been on the table for a long time. Even to this day conventional economists do not give importance to the relationship between energy and economic growth, thinking that the market by itself will be in charge of leveling energy production by finding the best alternatives through the law of supply and demand. But as we know, capitalism likes to expand by consuming efficient energy without worrying too much about the social or environmental consequences, so leaving everything to market forces does not seem to be the best

alternative. Furthermore, so far it does not seem that any of the 'renewable' energies promoted by government agencies as the panacea to all the problems of the modern world are even close to granting the same energy advantages as those granted by oil in its heyday. For instance, in the case of the United States until before 1930 the combined EROEI of oil and natural gas was around 100:1, by 2010 it was closer to 20:1 due to greater difficulties in extracting oil and gas from harder to reach sources and greater costs in refining lower quality materials, in contrast, photovoltaics, biofuels, solar and less refined forms of extracting oil (such as tar sands) were well below an EROEI of 10:1(Murphy et al., 2010). Depletion is not being counteracted by innovation and the EROEI of hydrocarbons has been steadily declining across the globe for decades (Court & Fizaine, 2017; Lambert et al., 2014; Rhodes, 2017; Brandt et al., 2015).

Furthermore, returning to the scale problems and the exponential growth of the system, renewable energies, by having such low EROEIs, enhance the increase in production and energy expenditure, we can see that the problem with exploiting resources with reduced EROEI is that to be profitable at production scales such as those used by transnational capitals, production needs to be pushed to the limit to compensate for low energy efficiency with a large mass of product that gives a large mass of profit:

> Replacement of higher EROEI sources with lower EROEI sources results in an increase in the total energy input. Using published EROEI estimates for existing and new primary energy sources, we estimate that total energy inputs will need to increase by a minimum of 40% (and could increase by as much as 400%) to provide a fixed net useful energy for human societies. Growth in net useful energy demand will further increase these estimates. The timescale for these increases is given by the primary energy source replacement time, which historically has ranged from 30–50 years. (Deng & Tynan, 2011, pp. 2440-2441)

All of this without taking into consideration that oil is not just another energy source like all the other "alternatives", oil is the raw material of practically all of the cutting-edge industries worldwide and is what has allowed the unparalleled advance of the way of capitalist production around the world:

> The importance of oil to human global civilisation cannot be overemphasised, since not only does it provide the liquid fuels on which most of the world's transportation depends, but it underpins most of the chemical industry, and is the raw (carbon) chemical feedstock from which plastics, pharmaceuticals, and most consumer goods are made. Perhaps more strikingly, without oil, and natural gas to make fertilisers, modern agriculture could not exist in its present form: oil is not only needed to fuel tractors and combine harvesters, but the food produced is transported both around nations and the wider world. (Rhodes, 2017, p. 233)

The failure of the 'alternatives' within the system: sustainable development, green growth, degrowth and the circular economy

Sustainable Development

On light of what has been laid out in previous sections we can say that the idea of Sustainable Development is a fallacy, an oxymoron, the adjective contradicts the noun, or there is development or there is sustainability but not both at the same time (on a world-economy scale at least). Sustainable Development policies, on general, have not been successful since they began to be applied a few decades ago, one of the main causes of this failure being that industrialized countries have no real interest in changing current technological accumulation patterns due to the higher profit rates that they give, in addition to the fact that the so-called "green technologies" are not really so, since applied under a capitalist production scheme they are only profitable as long as they are produced on a large scale, consuming even more natural resources in the process, all of which leads to the fact that Sustainable Development policies are nothing more than a slogan or a declaration of good will where politics are almost totally disconnected from the real application in the economic sphere.

At least since 1987, when the concept of Sustainable Development was first coined, and more specifically since 1992 with the Earth Summit of the United Nations, there has been a concerted effort at the level of countries and international treaties to transition to a more sustainable world. However, the reality is that the idea has not gone beyond the concept, most of the 'achievements' are laws or agreements that remain dead rhetoric, such as the declaration of new Protected Natural Areas or updating goals that have not been met with new ones that will not be met either. The Millennium Development Goals were not met and gave way to the Sustainable Development Goals (SDGs) and in a few years we will be talking about how the SDGs were not met and gave way to other now more difficult goals to fulfill. In one of the most recent reports on the state of progress of the SDGs, it is mentioned that overall "high-income countries (HICs) and OECD countries are closer to achieving the targets than other country groups, yet none are on track to achieve all 17 SDGs" (Sachs et al., 2022, p. 17). The report also mentions that rich countries are 'hampering' poor and underdeveloped countries efforts to reach sustainable development.

In the same way, the Aichi Biodiversity Targets that were part of the Strategic Plan for Biological Diversity 2011-2020 were a resounding failure, in the 2020 report, at the end of the period of the strategic plan it was concluded that "at the global level none of the 20 targets have been fully achieved, though six targets have been partially achieved (Targets 9, 11, 16, 17, 19 and 20)" (Secretariat of the Convention on Biological Diversity, 2020, p. 10). In this way, some

'achievements' are highly acclaimed, but if we analyze the content of the goals that have been 'partially' achieved, we will realize that they are goals without substance, simple make-up, a disguise of progress made with the drafting of laws, reports and money spending: target 9, achievements in identifying and prioritizing invasive alien species; target 11, progress in designating new protected natural areas; target 16, entry into force of the Nagoya Protocol; target 17, progress in that various countries present strategic action plans; target 19, advances in scientific knowledge about the functioning of the biosphere; target 20, progress in increasing financial resources to apply plans that help meet Aichi targets.

However, despite the failure of laws and treaties, Law is one of the few weapons left to communities in struggle, so it is not convenient to underestimate the capacity of legal tools to enforce the right to a healthy environment. We have the example of the Montreal Protocol, which regulated the use of chlorofluorocarbons (CFCs) since 1987, successfully reducing the hole in the ozone layer considerably, a success that is constantly referenced as an example of the possibilities of the application of laws and the supposed possibility of green capitalism, but this type of success is only possible in cases in which the dynamics of capital accumulation can do without certain types of productive activities without damaging the foundation of the system. Thus, the use of CFCs decreased, but the use of other types of chemicals that destroy the terrestrial system in other processes has increased exponentially. All this without mentioning the practical ineffectiveness of legal actions to protect the most vulnerable strata of the world's population.

Green Growth (Decoupling)

Economists insist that 'green growth' can exist, to prove it they constantly refer to the idea of 'decoupling' economic growth from the use of resources, they argue that GDP can still grow while decoupling from resource depletion and contamination. But they handle everything in terms of percentages (e. g., the concept of Green GDP), and if the issue is analyzed in terms of the volume of resources used, the problem begins to be quite visible, GDP may theoretically still grow with less use of energy in relative terms, but in reality the use of energy does not stop growing, because the economy keeps growing in size in absolute terms. Thus, some degrowth theorists (as we will see in the next section) harshly critique the use of GDP as a measure of economic health and as a reference for environmental decoupling (Latouche, 2010). Therefore, degrowth theorists push for an absolute degrowth of production, since "de-growth implies physical de-growth or downsizing economic throughput as measured by material and energy flows. The debate rests on how much downsizing is necessary for sustainability

and whether there is an optimal scale of the economy" (Martínez-Alier et al., 2010, p. 1743).

We can mention the case of China, which at the moment is the country most involved in Circular Economy policies and the one that paradoxically seems to have the most advanced environmental legislation (despite some notable omissions), we observe that despite improvements in "eco-efficiency", total resource utilization has not decreased at all and the environmental destruction continues at higher scales, as might be expected from the energy efficiency paradox. The decoupling is only a relative decoupling:

> Data should, however, be interpreted with care. The absolute numbers show an increase in resource use in China, and a resource productivity ratio that is converging to EU numbers, yet it is still higher, i.e., the Chinese economy is less resource productive than the EU in absolute numbers. A main driver for relative decoupling in China has been GDP growth. (Bleischwitz et al., 2022, p. 5)

What current literature points to is that "empirical evidence on resource use and carbon emissions does not support green growth theory" (Hickel & Kallis, 2020, p. 469). In this regard, a 2023 study concluded that of 36 high-income countries studied only 11 had recently (between 2013 and 2019) achieved absolute decoupling (in terms of carbon emissions), but still the rates of the countries that are achieving absolute decoupling are far from what is needed to limit global warming to 1.5°C: "At the achieved rates, these countries would on average take more than 220 years to reduce their emissions by 95%, emitting 27 times their remaining 1.5°C fair-shares in the process. To meet their 1.5°C fair-shares alongside continued economic growth, decoupling rates would on average need to increase by a factor of ten by 2025" (Vogel & Hickel, 2023, p. e759).

The Circular Economy

Going into the definition of the concept, we see that there does not seem to be a consensus regarding many of the details that would define a Circular Economy. A 2017 study undertook the task of compiling the definition of the concept as it appears in 114 related publications and arrived at the conclusion that in general terms there is no single definition, and many contradict each other. Among the coincidences, what stands out the most is that most of the definitions put economic growth before environmental protection or see new business opportunities within a 'green economy'. This study's findings conclude that:

> […] the circular economy is most frequently depicted as a combination of reduce, reuse and recycle activities, whereas it is oftentimes not highlighted that CE necessitates a systemic shift. We further find that the definitions show few explicit linkages of the circular economy concept to sustainable development. The main aim of the circular

economy is considered to be economic prosperity, followed by environmental quality. (Kirchherr et al., 2017, p. 221)

We can see this in play in the European plan to implement a Circular Economy, where growth is still the focus: "In December 2015, the Commission adopted a Circular Economy Action Plan to give a new boost to jobs, growth and investment and to develop a carbon neutral, resource-efficient and competitive economy" (European Commission, 2019, p. 1). And going back to the problems discussed in previous sections, efficiency is not a deterrent for growth, and what the Circular Economy enthusiasts fail to discuss is the existence of a rebound effect within this framework, as such, they have "tended to look at the world purely as an engineering system and have overlooked the economic part of the circular economy […] circular economy activities can increase overall production, which can partially or fully offset their benefits" (Zink & Geyer, 2017, p. 593). As we saw when talking about 'Green Growth' what history seems to indicate so far is that decoupling economic growth from resource utilization is somewhat impossible when talking about large scales, and at the end of the day the Circular Economy is still based on the premise of growth.

And we still have other problems to consider that due to space restrictions should be discussed in another place, for instance the fact that full circularity is impossible for most materials and that the growth paradigm requires both extraction of new materials and attempts to reuse and recycle old materials. And we can also start by mentioning that more investment in 'cleaner' energies that have lower energy return on investment (EROEI), and more investment in recycling that is often more expensive than just regular extraction, and more investment to fix environmental disasters, and rising costs due to environmental taxes, etcetera, all of this keeps having an impact in the rate of profit and keeps pushing the increases in production to compensate the falling rates of profit with absolute masses of profits.

For some materials, notably cement, ceramics, and composites, there is as yet no recycling route by which the material can be returned to its original structure and quality […] For some materials, recycling generally involves a loss of quality […] in many cases recycled material must be mixed with virgin material to produce acceptable products, thus reducing the net benefits of recycling […] For many critical metals that are used in compounds (as alloys, or in electronics applications), the energy required to separate them as part of a recycling process may be significantly greater than the energy needed for virgin production […] For some materials, notably glass, the energy required for recycling is similar to that required for virgin production […] For other materials, such as paper, the

emissions benefit of recycling may be less than the energy saving. (Allwood, 2014, p. 464)

Degrowth

In the Working Group III contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (dedicated to assessing emission reduction and mitigation efforts) the word 'degrowth' appears 29 times (IPCC, 2022b), 8 times in text and 21 times in the bibliography, for a two thousand page report is not that much but nonetheless it does recognize this approach as one of the possible solutions that needs further exploration and that has not been sufficiently addressed by the IPCC: "scenarios that include climate change impacts or economic degrowth are not fully represented, as these scenarios, with a few exceptions, were not submitted to the database" (IPCC, 2022b, p. 383). Consequently, in the Full Synthesis Report released in 2023 that gathers the main contributions of the three working groups of the IPCC the degrowth approach is never mentioned (IPCC, 2023). This recurrent dismissal of the degrowth perspective by international organisms is in line with the mainstream perspective that claims that 'sustainability' and growth can go hand in hand, and when degrowth policies are taken seriously they seem to be within the framework of a 'tactical' degrowth in some aspects of the world economy, but not in a systemic sense: "The sustainability world (SSP1), for example, is a world with strong economic growth, but sustainability worlds with low growth or even elements of degrowth in developed countries could also be explored" (IPCC, 2022b, p. 1875). There are, however, studies that try to question the IPCC main scenarios by integrating the degrowth approach to the modelling of a 1.5°C scenario as required by the Paris Agreement:

> […] we find that the degrowth scenarios minimize many key risks for feasibility and sustainability compared to technology-driven pathways, such as the reliance on high energy-GDP decoupling, large-scale carbon dioxide removal and large-scale and high-speed renewable energy transformation. However, substantial challenges remain regarding political feasibility. (Keyßer & Lenzen, 2021, p. 1)

The challenge for degrowth lies in the last part of the quote, "substantial challenges remain regarding political feasibility". Degrowth requires political will and planification, something that I argue is not aligned with the underlying mechanisms of the world-system that mainly operates as an autopoietic system. Degrowth policies may find success at local or regional levels, but the challenge is systemic and needs to be addressed in a systemic way, as was previously mentioned, the fact that a few developed countries are achieving absolute decoupling does not mean that we are advancing towards the best scenario (Vogel & Hickel, 2023), living in a world-system means that rich countries can outsource

environmental damage to poor nations, thus achieving certain goals in a few developed parts of the system does not mean that the system itself is healing:

> Degrowth scholars emphasise that global absolute decoupling is currently not proceeding fast enough to meet Paris Agreement targets […] Ecomodernists point to important progress towards achieving absolute decoupling at the national or regional scale […] and the future potential of emerging technologies and policy reforms. (IPCC, 2022a, p. 173)

Nonetheless, degrowth theorists are advancing their theory by proposing reforms that could affect the system in its entirety. The notion that the system can be reformed is a whole debate in itself but we can start by mentioning some of the propositions given by some of the main degrowth scholars. For instance:

> […] we propose five types of reforms that can work together to favor futures where common people work, produce, and consume less, share more, enjoy more free time, and live with dignity and joy. These policy packages are: a Green New Deal without growth; universal incomes and services; policies to reclaim the commons; reduction of working hours; and public finance that supports the first four. (Kallis et al., 2020, p. 65)

A proposal of this style within a capitalist social reproduction scheme sounds crazy, it is not very or at all compatible with what capitalism is, and there are problems that go hand in hand with decreasing, the most obvious of them is unemployment, because how can jobs be generated in a context of negative growth and rising capital intensity. How to tell workers and unions to support the initiative if their quality of life in a context of growing impoverishment depends on growing economies; capitalism has made workers dependent on economic growth and they can no longer be asked to return to self-subsistence schemes when well beyond half of the global population lives in cities: "Under current economic and fiscal policies […] degrowth has been argued as an unstable development paradigm because declining consumer demand leads to rising unemployment, declining competitiveness and a spiral of recession" (IPCC, 2022a, p. 2718). There are some developments within degrowth literature that try to tackle this issue (Hickel, 2020) but the propositions are still far from getting into practice at a global scale.

Degrowth in its more refined form seems to be the 21st century version of Marx's utopian vision (a science-based utopia), because in its core degrowth is not just about slowing down growth just for the sake of it, degrowth is not just austerity, degrowth focuses on a redistribution of wealth where everyone has their needs met, where society produces based on human needs and not based on the needs of profit:

> While austerity increases inequality by curbing public services and benefitting the rich through tax cuts and privatisation of government services, degrowth policies focus on democratising production, curbing the wealth and overconsumption of the rich, expanding public services, and increasing equality within and between societies. Degrowth is also not a recession: recessions are unintentional, while degrowth is planned and intentional. (Schmelzer & Vansintjan, 2022)

In this sense, Degrowth seems to be the most serious alternative to our current predicament and the one that needs to be taken more seriously, but most of its propositions ultimately go against the core values of the capitalist system and capitalism would need to destroy itself for Degrowth policies to flourish.

Conclusions: notes for a dystopian Marxism

What we observe is that the alternatives that seem to be more 'viable' are actually not achievable within a frame of production like the capitalist one, because they either generate more production or directly go against the generation of profit. And it should be remembered that a good part of the sustainability argument is based on the premise of the transition to renewable energies, however, renewable energies by themselves are promoting the increase in production, not the other way around. We can mention that in BP's 2022 report on global energy use it mentions that "primary energy in 2021 grew by its largest amount in history, with emerging economies accounting for most of the increase" (BP, 2022, p. 4). Has the use of renewable energy increased? Yes, promoting growth and the creation of new markets. Has the use of fossil fuels also increased? Yes, to new historical levels. So what game are we playing? The game of covering up rotten flesh with cheap make-up, false hopes, and perfumes of sustainability while the paradigm of growth continues unscathed. We are talking about ecological suicide even in the case of an economy that stops growing but keeps the same scale of production every year, a 0% growth under the current scale of production is still ecological suicide given the massive use of resources in absolute terms. Degrowth may start happening, but not due to the successful application of degrowth policies, if it ever happens it will be due to real physical limits signaling the start of the environmental collapse or due to an all-out war in the race for what's left. Within a capitalist mode of production voluntary degrowth is not an option, capitalism is structurally bound to keep growing as long as the material conditions of the natural world allow it, this is what is meant by 'destructive autopoiesis'.

The 'real' alternative would be in a mode of production that worries about life and not profit, in a redistribution of resources according to capacity and necessity (as Marx would say) and not according to the principles of unrestrained accumulation; but in this case we would be talking about a 'ghost' that very few want to see traveling the world and that has no clear way of materializing. In this way, we

conclude this article with a reflexion about this state of affairs that also doubles as a personal positioning regarding the destiny of capitalism and the role that a 'revolutionary subject' could play in this bleak outlook, a positioning that is sure to upset a lot of dogmatic Marxists and a lot of social science theorists that put the subject as a God and as the ultimate agent of change.

Throughout the whole turbulent history of Marxism, we can find two big currents, those that Ernst Bloch in his already classic book 'The Principle of Hope', described as the 'warm' and 'cold' currents. The first one, the warm one, is that of utopian thought, the one that thinks that there is light at the end of the tunnel, while the cold one is that of rational and objective thought where the cold hard facts and the 'science of material conditions' rest. These two currents seem to dominate the intellectual landscape, alternating periodically depending on the mood of the times, however, according to Bloch, the good Marxist theory should draw on both currents to avoid an approach that is not dialectical (Bloch, 2007, pp. 251-252). The problem with Bloch's conceptualization is that only the warm and hopeful Marxism is the one we can describe as being a 'philosophy of the future', a materialism that goes forward 'to reach home' and liberty, while the cold Marxism remains anchored in the present of the objective conditions (Bloch, 2007, p. 253). Taking into account the disenchantment of these times, perhaps we should add a third current, one that derives from the coldest Marxism to the point of becoming almost glacial, in which, based on the analysis of the trends and laws of the capitalist system in the long term, we can predict that the most likely scenario is not that of Utopia but that of Dystopia, that of the worst possible future. We could call this glacial Marxism with the simple name of Dystopian Marxism.

Particularly, the gravity of the ecological crisis that we face at the beginning of the 21st century, which has no signs of slowing down, allows us to think quite clearly and without being too farfetched that capitalism can end, but not because of revolutionary activity but due to an abrupt ending of life in civilization as we know it due to an ecological collapse that prevents capitalism from continuing with the rate of accumulation to which it has been used to for at least two centuries. The question is whether the will of warm Marxism and its philosophy of the future provides enough tools to think of a way to avoid this scenario of collapse, or if, on the contrary, dystopian Marxism anchored in cold Marxism has even more convincing arguments to prove that we are on the verge of collapse and that given the conditions and laws of the historical accumulation of capital that we know, there is no way that a contemporary revolutionary subject can do something in time to change this state of affairs. I believe that the time of Utopia has passed, I believe that accepting hopelessness can give better solutions to the issues that are coming our way. As Žižek would put it: "The true courage is not to imagine an

alternative, but to accept the consequences of the fact that there is no clearly discernible alternative: the dream of an alternative is a sign of theoretical cowardice" (Žižek, 2017, p. 4).

Thus, reconceptualizing the idea of growth and the idea of a sustainable economy also involves reconceptualizing the idea of a social agent willing to generate these changes, a social agent that disappears in mathematical models and is replaced by "rational actors" who are usually companies or states that supposedly, in the pursuit of their own benefit, achieve a general benefit and a balanced development that has not yet been achieved in at least two centuries of capitalist history (at least as far as environmental degradation is concerned). For example, when we talk in economic theory about the existence of rational consumers, we are dealing with an abstraction of such magnitude that we could think that these are treatises on metaphysics; in reality, the rational consumer (as well as the rational producer) are just abstractions of theoretical equilibrium models that do not match with reality (Keen, 2011).

In this sense, an extensive analysis of the modern "revolutionary subject" that is subsumed by the system's autopoiesis is also one of my interests, but it escapes the scope of this article. For now, I will say that what the research I have done so far tells us is that in the Long Duration and in terms of world-economy the action of the subject has not altered the dynamics of capitalist accumulation as it relates to exponential growth and ecological destruction. Quite the contrary, every attempt by the "historical subject" to take the reins of world production in a social, communal, and sustainable way has ended up promoting the development of capitalism (despite its initial intentions), be it the Russian revolution, the Chinese revolution, or more recently Bolivarian revolution. Thus, the economic sphere seems to function independently of the will of individuals, it appears as an autopoietic system, as understood by Niklas Luhmann (2013), in which the social glue becomes money and the connection between individuals and therefore the creation of social relationships only occurs through money as a medium while capitalism expands extensively and intensively.

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