

real-world economics review

Please [click here](#) to support this journal and the WEA

Subscribers: **25,111** [subscribe](#) [RWER Blog](#) ISSN 1755-9472

A journal of the [World Economics Association](#) (WEA) 14,468 members, [join](#)

Sister open access journals: [Economic Thought](#) and [WEA Commentaries](#)

[back issues](#)

Issue no. 112

December 2025

[ECONOMICS 100: Overpopulation is a wicked problem](#)

[Theodore P. Lianos](#) 2

[The Transformational Role of Artificial Intelligence in the Pursuit of Good Economic Governance](#)

[Constantine E. Passaris](#) 21

[Elements for a Radical Inflation Targeting](#)

[Carlos Guerrero de Lizardi](#) 36

[Beyond *Homo Economicus*: An Interdisciplinary Critique of Rationality in Economic Decision-Making](#)

[Constantinos Alexiou](#) 47

[The Solow Residual or What Happens When Moral Philosophers Try Their Hand at Natural Philosophy](#)

[Bernard C. Beaudreau](#) 66

[Teaching Economics of Populism](#)

[Junaid B. Jahangir](#) 86

[Strength and weakness of Germany’s economy](#)

[Leon Podkaminer](#) 101

[Gendered Exposure to Artificial Intelligence in Labor Markets: A Comparative Political Economy](#)

[Analysis of Bulgaria, Romania, Germany, and India](#)

[Daniel Petrov](#) 108

[End Matter](#)



WORLD ECONOMICS ASSOCIATION

Periodicals
 Economic Thought
 World Economics Review
 Real-World Economics Review
 WEA Newsletter

Online Conferences
 Book publishing
 Textbook Commentaries
 Reform Networks
 Blogs

[support this journal](#)

[visit the RWER Blog](#)

ECONOMICS 100: Overpopulation is a wicked problem

Theodore P. Lianos

[Professor Emeritus, Athens University of Economics and Business, Athens, Greece]

Copyright: Theodore P. Lianos, 2025

You may post comments on this paper at

<http://rwer.wordpress.com/comments-on-rwer-issue-no-112/>

1. Introduction

It is often said that if a problem is well defined a solution can always be found. This may be true for some problems as for example in mathematics or for chess games where the player is asked to check mate in three moves, but in social and economic sciences this is certainly not true. Think of the problem of unemployment ever present in capitalist economies. Is unemployment rate of 6% a problem or is it frictional? Is it because of deficient aggregate demand or is it structural? Is it a result of underconsumption or because of a fall in exports? How can we reduce unemployment, by reducing tax rate or by increasing investment in technical education?

Evidently, social problems are wicked. Ritter and Webber (1973, p.160) call some problems wicket not because they have ethically deplorable characteristics but because they are malignant (in contrast to benign), or vicious (like a circle) or tricky (like a leprechaun) or aggressive (like a lion in contrast to a lamp). They also give ten characteristics of wicked planning problems.

In general, a problem may be defined as wicked if it has no unique solution and the choice of any solution involves economic, political and/or ethical considerations. It follows that any choice we make will have to consider benefits and damages, economic gains and losses for those directly affected, and also the ethical value of the actions needed to be taken for an effective solution.

It is not necessary but perhaps it is useful to remind ourselves that on Earth there are nonliving things (e.g. stones), living things (e.g. trees), nonhuman animals and humans, and that the solution of social problems may involve, directly or indirectly, all these entities. Therefore, in making decisions about the best solution the effects of the possible solutions on each of these entities must be considered and this necessarily implies an axiology of humans relative to the other three. The axiology is done by humans because they are the only living animals that can make a judgment and support it with arguments. Nonhuman animals have sentiments and feelings but they cannot express them clearly in a dialogue.

In making judgments humans differ substantially because of differences in culture, in personal past and present experiences, in psychology, in education, in social or political ideologies etc. Thus, we now have at least four philosophical positions regarding the relationship of humans to the other entities: deep ecology, biocentrism, ecocentrism and anthropocentrism. The author of this paper tends to side with weak anthropocentrism which recognizes ethical responsibilities to other humans and leads to best life in the Aristotelian sense, namely a temperate and liberal life (i.e. a comfortable but not luxurious life).

2. Environmental Problems

We often read or hear about the problems of the environment. It is useful to point out that generally speaking this is an error in syntax. The environment has no problems. It is us humans that have the problems. If a glacier melts and the level of the sea rises this is not a problem of the glacier or of the sea, it a problem of the humans that may need to relocate. This is not a grammatical error; it is a subconscious tendency to shake off our guilt.

Any reference to environmental problems brings to mind air pollution, deforestation, soil degradation, water scarcity, loss of biodiversity, plastic pollution, ocean acidification and of course climate change. To these we should add scarcity of land for production of food. All these problems can be seen as results of transgression of the limits imposed by nature.

How is it possible, one may ask, for humans to observe galaxies thousands of light years away from the Earth and not see the limits in the resources of the Earth? To this question several answers can be given.

- Until very recently many people did not know what an environmental problem is. Most people know now because of the publicity given to the change of climate.
- Many people know but they do not care enough to participate in political movements or pressure groups involved in protecting environment.
- Many people, perhaps most, know and understand the importance of environmental problems but they discount the future by a 100% discount rate and continue to enjoy life without any remorse for the consequences of their action, e.g. many children per couple, overconsumption and wasteful living.
- After the 2nd World War a culture has been developing that encourages breaking the limits in many parts and norms of social life including economics, politics, arts, ethics, education etc. That led to rising demand, directly and indirectly, for economic growth. Huge flows of migration to Australia, Canada, USA and to some European countries (mainly Germany) helped all countries grow. Thus, production and consumption became the prime objective of economic and related policies. China and the Soviet Union had no choice but to compete with each other and with the developed countries in economic as well as in military power. Per capita GDP and its growth became the dominant statistic around the entire world. Thus, the perceived need for production and consumption prevented peoples and governments from seeing the limits of the Earth's resources. Consumerism has conquered human society.
- Wealthy people, politicians, businessmen, and the military, i.e. the ruling class, seem to believe that the dreadful consequences of the environmental disasters would not affect them. Only the weak and the poor will suffer but who cares.

Of course, the academic community, at least part of it, saw the dangers of approaching and surpassing the limits. Ehrlich (1968), Ehrlich and Holdren (1971), Boulding (1964, 1966), Daly (1968, 1972), Georgescu-Roegen (1971, 1975) and Meadows et al. (1974) in the sixties and early seventies sounded the alarm. However, capitalists in their attempt to maximize profits and grow willingly ignored the warnings while governments had neither the strength nor the desire to impose limits and rules in the use of resources.

Thus, we have reached the point where the ecological footprint is currently 2.75 global hectares per capita while biocapacity is only 1.63 global hectares per capita. In other words, we are using the resources of the Earth 70% faster than they can be replenished. That means we are overproducing and overconsuming.

3. Population

People need food, clothes, houses and many other commodities for a good life. It is self-evident that the origin of all environmental problems is the production of commodities. Assuming that all production activities are registered in the Gross Domestic Product (GDP) statistics, the impact of production on the environment can be written as

$$I = T \times GDP$$

where I is any kind of measurable impact and T is a parameter connecting production with its impact and its value depends on the technology used in production. This equation is not a scientific hypothesis; it is simply a description of an observed fact. It is informative to divide and multiply GDP by the size of population and write the above equation as

$$I = T \times \frac{GDP}{P} \times P$$

This is known as the IPAT equation and it is very useful in identifying the main source of the impact in comparing per capita GDP (GDP/P), as a proxy for affluence, with the size of population among countries or regions, for example USA with China or with India, and North with South.

This equation also tells us that there are only three ways by which the impact of production on the environment can be reduced; by reducing the value of the technological parameter T or by reducing per capita production or by reducing the size of population or by any combination of the three. It is useful to emphasize that this is true for any system of social organization. In other words, this is true for capitalism, for socialism, for a mixed economy, for developed as well as for developing economies. However, as will be shown later, a given social system may favor one way and reject the others.

Microeconomic theory teaches us that the production of commodities requires a combination of labor, resources, and capital in proportions determined by the type of commodity and the available technology. The usual textbook description of the production process is the Cobb-Douglas production function

$$Y = AK^{\alpha}L^{1-\alpha}$$

where Y is total product, K is capital and L is labor. The factor A is an expression of the technology used in production. This production function has the nice property of declining marginal product of either factor when the other factor remains constant. For simplicity all inputs to production other than labor are included in the definition of capital. In specific applications other inputs may be included as for example land in studies of agricultural production.

The concept of the production function reminds us of the obvious fact that for the production of commodities both labor and resources are necessary. In order to have an apple it is necessary to have an apple tree and to make the effort to cultivate it.

The labor force of an economy is part of population and is defined as the number of people who are able and willing to work. This is usually half of the population. For example, in the European Union in 2024

the labor was 220 million and the population 450 million. For the USA in the same year the corresponding numbers were 170 and 340 million.

4. The Dual Role of Population in the Economy

4.1 Developed economies

Population has a dual role in the functioning of every economy. It is the source of labor for the production of commodities and at the same time it is the sum of consumers who buy the commodities produced. In other words, people produce and consume what they produce. Nothing strange or unnatural in this circular flow of goods often called *wheel of wealth*. However, our understanding of the circular flow of goods takes a different turn if we examine the differences among various groups of the population in their economic behavior. People with low income (mainly wages) necessarily spend all or most of it on consumption whereas wealthy people with high income (mainly profits) consume a very small proportion of their income and save the rest for investment. Generally speaking, in capitalist economies workers have a high propensity to consume and a low propensity to save whereas capitalists have a low propensity to consume and a high propensity to save. Of course, in terms of absolute size wealthy people consume and save much more than the low income people.

This difference in spending and saving between social classes, e.g. workers and capitalists (capital owners), together with the motive of capitalists for maximum profits explain why it is so difficult to solve the problem of overpopulation. The explanation in general terms is as follows. Under normal economic conditions the savings of each period (let say a year) are invested and increase the stock of capital thus increasing the productive capacity of the economy and the supply of goods and services in the next period. But there is no systematic reason that would automatically lead to higher consumption and therefore the problem of underconsumption appears. The best solution to the problem of underconsumption is to increase the number of consumers and this means to increase the size of population.

The last two hundred years of capitalist growth the size of the world population has increased from 813 million in 1800 to 8.19 billion in 2025 (June). During the last seventy years the world population tripled from 2.54 billion in 1950 to 7.8 in 2020, and in the last five years increased by almost four hundred million or 80 million per year. Thus, the increase of population provided the labor force for economic growth and at the same time the consumers needed for buying the commodities produced.

The need of capitalism for growing population is evidenced in the immigration policies of many capitalist countries. The USA, Canada and Australia have been countries of destination for very significant flows of migrants since 1850. Also many European countries (Germany, UK, France, Belgium and more recently Sweden) after the 2nd WW have welcome migrants from other European countries (Italy, Spain, Greece, Yugoslavia) and from their colonies. An important effect of increasing population either by high fertility rates or by immigration is that it keeps wages at a low level, at least lower than what it would have been without increasing population.

4.2 Less developed economies

In the less developed economies population is the source of labor supply to the growing industrial and service sectors and also to the agricultural sector including family farms and to small family business.

Very often this involves child labor which is criticized as an unethical and unproductive practice because it keeps children away from school.

The less developed countries are overpopulated. Only seven countries (India, China, Indonesia, Pakistan, Nigeria, Brazil and Bangladesh) count for about 50% of the world population, i.e. 3.95 billion of a total 8.19. The large family model that results in overpopulation of the country also serves as a social security plan for the old age. If a family has many children some will survive and will be able to take care of their parents in their old age. Of course, there are many reasons, economic, cultural, religious etc. that support the large family model.

The less developed countries are not just one category. Sometimes they are divided in two categories: emerging (or developing) and less developed. Other categories may be defined. For example the World Bank uses four categories on the basis of GDP: low, lower-middle, upper-middle and high income countries.

4.3 Comment

It is clear that there are many differences among countries in their historical background, culture, religion, resources and level of development. For our examination of the overpopulation problem it is necessary and useful to use the model of capitalism, which is the dominant social organization system today and ignore the specific characteristics it may have in any given country.

Thus we are going to briefly discuss the basic element of a democratic capitalist economy with two social classes, capital owners that possess the means of production and workers that possess their labor power. The country has a maximum of resources given by nature. The technology of the economy is embodied in the Cobb-Douglas production function. Capitalists maximize their profits; workers maximized their utility from consumption. Before we do that it is useful to present some data of the growth of GDP and Population in the last 65 years.

5. GDP and Population in the last 65 years.

The table below shows the world GDP in trillion of US\$ in constant prices (2015), the size of world population in billion and per capita GDP in US\$ for the beginning year of every decade since 1960.

Table 1

YEAR	GDP	Population (Pop)	GDP/Pop
1960	11.1	3.04	3651
1970	18.3	3.70	4946
1980	26.0	4.46	5830
1990	36.1	5.34	6760
2000	48.4	6.14	7816
2010	65.0	6.96	9339
2020	82.7	7.80	10603
2025	93.4	8.20	11390

Source: World Bank

The data on Table1 show that the world economy has done extremely well during the last 65 years. The world GDP increased by 745% and the world population by 166%. Per capita GDP increased by a little more than three times. The important factors in the growth of GDP are changes in technology and investment in human capital.

The enthusiasm caused by these data is greatly reduced by the negative effects of economic growth on the environment we have already mentioned in a previous section and by the great income inequality among countries and among people. In some countries (USA, Denmark, Germany, Australia etc.) per capita GDP is greater than 50 thousand US\$ and in other countries (Indonesia, Mozambique, Jordan, Egypt etc.) is less than 5 thousand US\$.¹ Also, poverty is not absent even in the most wealthy countries. In the USA the percent of poverty is 17.8, in Germany 14,8, in Canada 11.6, in Great Britten 18.6, in Sweden 17.1, etc.² These percentages correspond to millions of people.

The most impressive statistic for economic inequality is the distribution of wealth. According to the World Inequality Report Data Base of 2022 the poorest 50% of world population owns 2% of the global wealth, the middle 40% owns 22% and the upper (richest) 10% owns 76% of the global wealth.

Taking into consideration the environmental problems and the huge economic inequalities the sad conclusion is that capitalism is not exactly the paradise that economic growth has promised.

6. Grow or Die

Capitalism has often been characterized as a “Grow or Die” system. In reference to living organisms “grow or die” is a truism. In reference to individual firms in capitalism it may be true as in cases where a firm cannot grow for any reason and competitive firms grow and conquer the market. However, there are millions of small or middle size firms that do not grow and survive for decades. They may shut down for other reasons as e.g. death or heirs with different interests, but not because they do not grow.

The “Grow or Die” statement applied to capitalism as a system of social organization may be true under certain conditions and wrong under other conditions. This will be explained later on but let us now briefly say that if population continues to grow and resources are completely exhausted intensifying the environmental problems capitalism will end up in a messy and miserable situation with unknown future. However, if population stabilizes and begins to decline fast and capitalism reaches a steady-state position firms do not need to grow in order to survive.

The “Grow or Die” dictum may be taken as an indication of the instabilities of capitalism due to the behavior of capitalists who need to invest their profits but only when the profit rate is satisfactory. This behavior results in the phases of growth and recession of the trade cycle.

7. A Simple Model

A simple way to show the instability of the capitalist system is by means of Fig. 1. Macroeconomic equilibrium in the economy occurs when total demand is equal to total supply. Total demand is the sum of consumption (demand for consumption goods) and investment (demand for investment goods). The vertical axis of Fig. 1 measures the level of consumption and the level consumption plus

¹ World Bank Indicators, GDP per capita for 2021.

² World Population Review, Poverty rate by country, 2022.

investment. The horizontal axis measures the level of GDP. The 45° degree line is by definition the locus of points where $C+I=Y$ or where total demand and total supply are equal, and the economy is in macroeconomic equilibrium.

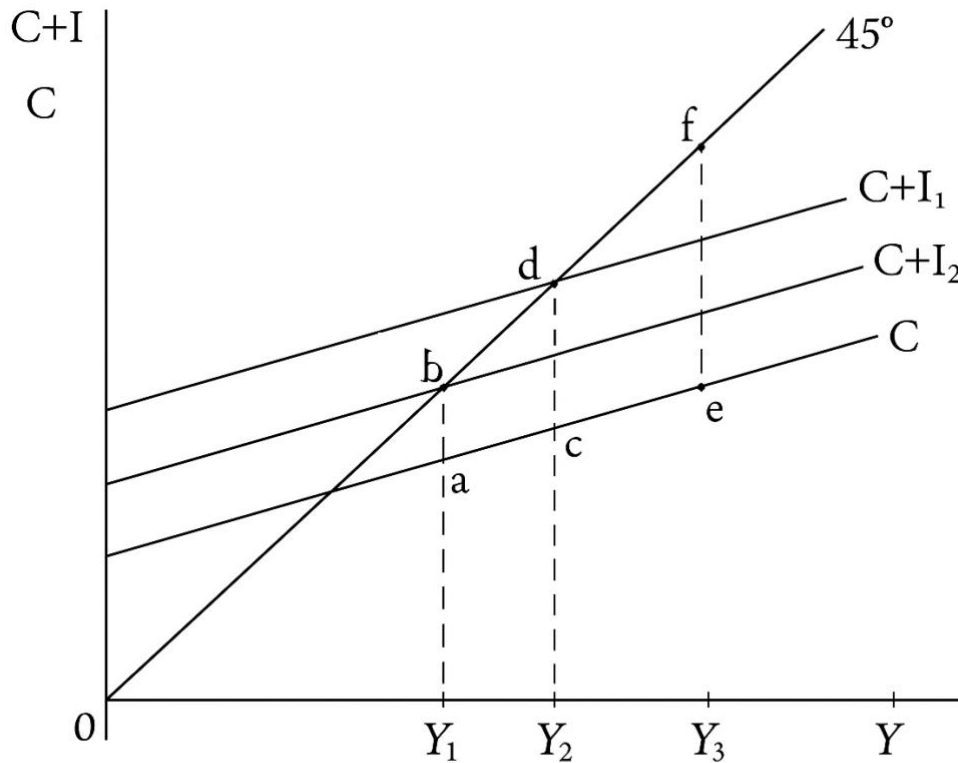


Fig.1.

For simplicity, consumption is assumed to depend only on Y and investment is independent of Y . In the period with consumption equal to aY_1 and investment equal to ab the equilibrium level of income is Y_1 . Total demand ($C+I$) is equal to total supply (Y_1) as shown by the 45° degree line. But now the investment of this period (ab) becomes part of the capital stock of the economy and increases the productive capacity by the distance $Y_1 Y_2$. In the next period, equilibrium at Y_2 requires investment to increase to the level of cd . If that happens the productive capacity of the economy will increase to Y_3 and this requires a further increase of investment equal to the distance ef . If the increasing capacity of economy to supply goods does not meet sufficient demand the investors will be disappointed and income will decline and the economic will enter a period of recession. Thus the economy can either grow or decline. This is the essence of “Grow or Die” for every firm and for the economy as a whole.

Of course, new investment is not the only way to close the gap between total supply and total demand. Public works, exports, low interest rates and advances in technology, and methods to increase the propensity to consume are often used among others. One important factor that increases consumption, in the short run and in the long run, is the growth of population size. Increasing population means more consumers. When businessmen make plans for their future production they always take into consideration the size and the changing age structure of the population.

For the economy the ultimate limit to growth is the lack of resources, human and natural. However, there is an important difference between humans and nature. Human resources can increase in

numbers as the size of population increases whereas the resources of nature are limited by the size of the Earth. The inability and/or unwillingness to recognize this has led to the present dramatic condition of the planet and of human society.

8. Is the Earth Overpopulated?

In order to determine whether the Earth is underpopulated or overpopulated it is necessary to have an estimate of the optimal size of population. This, in turn, requires the selection of one or more criteria and a judgment about the extent the criteria are satisfied. The obvious candidate for such a criterion is the welfare of humans living at the present time and of the future generations. If we agree on the definition of welfare the next step is to make a judgment about the level of welfare that is deemed satisfactory.

In economics the term welfare means economics welfare, that is, the quantity of goods and services available to the individual and from which the individual derives utility. For a family the level of welfare is measured by the level of its income, and for the economy as a whole by gross domestic product per capita (GDP/pop). Of course, the GDP per capita may be misleading to some extent because it hides the differences among individuals and families. Even so, it is a useful measure of a country's welfare when comparisons are made.

Once the measure of welfare is accepted the next step is to determine what level of welfare is satisfactory. For example, if the measure is GDP per capita, the next step is to decide what level is satisfactory. Should we take the GDP/P of USA, of China, of India or of Luxemburg? On this issue everyone may have a different opinion. Depending on the economic and social environment, the wealth of the family, the tastes, the philosophy of life etc. there may be a big variety of opinions. Let us assume that a yearly income of 60000\$ for a family of four (15000\$ per capita) is sufficient for a satisfactory but not luxurious standard of life. The world GDP for 2024 was 110 trillion US\$. Therefore, if everyone were to have 15000\$ the world population should be 7.3 billion. The current world population is 8.2 billion. It follows that the Earth is overpopulated and the excess population is about one billion (8.2-7.3).

Of course, GDP is not all available for consumption. Part of the gross product is invested in order to replace the depreciated capital. The rate of capital depreciation is approximately 10-15% per year and thus the net world product is about 100 trillion US\$. Dividing 100 trillion by 15 thousand gives a world population of 6.7 billion and strengthens the conclusion that the world is overpopulated.

Unfortunately, this is not the end of the discussion because the estimates of GDP ignore the existence of the environmental problems caused by the production of GDP. Therefore we need an estimate of GDP that minimizes the environmental problems or to put it differently a GDP that does not disturb the ecological equilibrium. One way to define ecological equilibrium is to say that the demand for resources should not exceed their supply. The demand for resources is approximated by the ecological footprint (EF) and the supply of resources by biocapacity (BC). The condition for ecological equilibrium is $EF=BC$. This means that the world production of commodities should use the resources of the Earth in such a way and to such an extent that the future generations will not be prevented from enjoying the same level of economic welfare. If we can find the level of world GDP at which ecological footprint is equal to biocapacity then we can make an estimate of the optimal population size.

9. Optimal World Population Size

We may define the optimal size of the world population as that size that satisfies two conditions: (a) total production should not violate the condition that ecological footprint should be equal to biocapacity (or less), and (b) the per capita product should be sufficient for everyone to have a comfortable but not luxurious life.

In 2022, the ecological footprint was 20589 million global hectares and the biocapacity was 12044 million global hectares. The world gross product of the same year was 102 trillion US\$ (current prices). If the ecological footprint were to be equal to the biocapacity of same year the world gross product should be equal to 60 trillion $\{(12044/20589) \times 102\}$. This is a grosso modo calculation of the size of the world GDP that would be consistent with ecological equilibrium.³

As was pointed out in the previous section the per capita product that should be sufficient for comfortable life is difficult to estimate because there is no objective measure of what comfortable life is. Different people, if asked, would give different answers depending on their value system, their family income, their age, their country etc. Comfortable life is certainly related to the quantity and quality of goods and service we can enjoy with our income. Therefore, let us try three different levels of per capita GDP: (a) the per capita GDP of the European Union which in 2022 was approximately 38000 US\$, (b) the per capita GDP of a country which is neither wealthy nor poor, i.e. Greece with per capita GDP of 21000 US\$ in 2022, and (c) the per capita GDP of Mexico of 10000 US\$ in 2022.

With these assumptions and with a world GDP of 60 trillion, i.e. consistent with ecological equilibrium, we can have three estimates of optimal population size. If we choose the per capita GDP of the European Union (38000 US\$) the optimal population size is approximately 1.6 billion people (60 trillion/38000). If we choose the per capita GDP of Greece (21000 US\$) the optimal population is approximately 2.9 billion people, and finally if we choose the per capita GDP of Mexico (10000 US\$) the optimal population is approximately 6 billion. Thus, all three estimates of the optimal population are lower than the current population of 8.2 billion.

It is perhaps better instead of per capita GDP to use per family GDP because there are economies of size in a family and therefore life in a family of four is more comfortable than living alone. It is my experience that a yearly income of 84000 per family is more than enough for a comfortable life. The European Union per family GDP of 152000 US\$ means extravagance and luxury. Therefore, under the present circumstances the optimal population size is 2.9 billion. It is interesting that others have reached the same conclusion using different methods (Pimentel et al. 1994, Daily et al. 1994, Dasgupta et al. 2017).

10. Yes, the Earth is Overpopulated

The conclusion to be drawn from the above calculations is clear: the Earth is heavily overpopulated. The present population of 8.2 billion is almost three times the optimal size of 2.9 billion. Even if ignore ecological equilibrium and the restriction of the ecological footprint to be equal to biocapacity (EF=BC), with the net world GDP equal to 100 trillion and a satisfactory per capita GDP of 21000 the world population should be only 4.8 billion. In brief, it seems undeniable that our planet is overpopulated.

³ See Lianos and Pseiridis (2016).

However, there are people that believe the present size of the world population is not a problem and also people who prefer to ignore the significance of population as an important variable for the present state of the world economy and of human society. Businessmen, big and small, favor increasing population so that they have ample supply of labor, low wages and consumers for their products. Technology may substitute to some extent for labor but does not create sufficient demand for commodities. Growing population is the condition for the expansion of production.

Also, there are Marxists academics and politicians who prefer to ignore the problem of overpopulation and remain faithful to their master Karl Marx who was happy to severely criticize Malthus and simply say that each historical mode of production develops its own law of population. In the Marxian analysis the relevant variable is the industrial reserve army of the unemployed, not population.

11. How can the overpopulation problem be solved?

For our purposes solving the overpopulation problem simply means reducing the size of population to a substantial extent, i.e. to a size that allows the environmental problems to be adequately reduced and the excess of ecological footprint over biocapacity to be reduced or disappear.

Excluding causes of population reduction such as the bubonic plague, the epidemic known as “black death” that killed 50 million people between 1347-1351 and reduced the population of Europe by 50%, and the 2nd WW where approximately 80 million soldiers and civilians were killed, generally speaking, there are two ways to reduce the world population: (a) by persuasion and (b) by legal restriction.

To persuade couples to reduce the number of children they wish to have the following methods may be used and hope that they may have good results:

1. Information about the use of contraceptives at low prices.
2. Family planning.
3. General and relevant education of both men and women.
4. Economic motives, i.e. subsidies of various types to families with one child.
5. Supporting with various ways a culture of small family.
6. Moral persuasion and admonition.

The sad truth is that these methods have failed to deliver the expected results. The method of economic motives has been used by some countries to bring the opposite results, i.e. they subsidized families with three or more children. As a result the world population continues to grow by approximately eighty million people every year. It increased from 7.821 billion in 2021 to 8.162 in 2024, and it is expected to be 8.231 billion by the end of 2025.

There is a widely spread strong pro-natalist belief that big family increases the welfare of its members. The need of the capitalist economy for increasing labor to keep wages low and consumption high, and the religious teachings have cultivated pro-natalist ideas. Also, children serve as unpaid labor force in family business and more so in the agricultural sector. In countries with high child mortality and lack of social insurance system the big family is security for the old age. All these factors have led to the establishment of a pro-natalist attitude.

Legal restrictions are limitations imposed by the State restricting directly or indirectly the number of children per woman. Aristotle in his *Politics* and Thomas More in his *Utopia* suggest a minimum age for men and women before they can be married. In 1964, Kenneth Boulding suggested a plan with transferable birth license for every couple that has never been applied.⁴ In modern times, China introduced the one child policy from 1979 to 2016 when two children per family were allowed.

Non-coercive policies may or may not produce the expected results but they do not create additional problems. Coercive policies may have the expected results but in addition to the ethical problem they create practical problems as well. In China, for example, the traditional preference for boys and the possibility of early diagnosis have resulted in millions of abortions and a large deficit of women. Also, the big fines on the family for having more than one child have resulted in many new births to remain unregistered. However, on the positive side, the Chinese claim that without the one child policy the population of China would be higher by 400 million people and also that the reduction of population was of critical importance for their economic development.

11.1 Should coercive policies be completely excluded?

It is true that coercive policies for population reduction seem offensive to human rights and may reduce the welfare of the individual affected by these policies. However, not all coercive measures are equally abusive and do not equally affect the individual and general welfare. We are subject to coercive measures every day. Even in the most democratic States we are coerced to follow general rules every day. We are forced to military service, to pay sales and income taxes every day and every year, to drive on one side of the road, to send our children to school, etc. We accept these rules because we realize that the benefits from following the rules exceeds the disutility involved. Also, if a coercive measure has general applicability people may not perceive it as binding their choices.⁵

Fifty five years ago Ehrlich and Holdren (1971) ended their essay with these words: “To ignore population today because the problem is a tough one is to commit ourselves to even gloomier prospects 20 years hence, when most of the ‘easy’ means to reduce per capita impact on the environment will have been exhausted. The desperate and repressive measures for population control which might be contemplated then are reason in themselves to proceed with foresight, alacrity and compassion today”. Unfortunately, in the years that followed, humanity proceeded neither with foresight nor with alacrity but rather with complete indifference with regard to the environment. Today, fifty five later, we are faced with an explosive situation. We are facing an extreme situation and we need to consider taking extreme measures.

In principle, coercive measures should be avoided but when a situation becomes critical they should be weighed against the alternatives. There is also an intergenerational justice issue involved in the present situation. By forcing people to have less children than they might want to have will certainly reduce their welfare. However, given the present situation and the finite resources, if they are allowed to have as many children as they want the welfare of the future generations will be greatly and negatively affected. In a real sense, the present generations by their numbers and their consumption habits are using resources that will be lost for the next generations. In essence, this is no different from the act of a thief who steals corn from the barn of his neighbor. Although freedom is a fundamental

⁴ For a variation of Boulding’s plan see Lianos(2018).

⁵ It is interesting to mention that an opinion poll published by the Pew Research Center (located in Washington, DC) in August 2008 said that the one-child policy of China was overwhelmingly accepted by the Chinese public with a 76% approval.

right, the thief is imprisoned. One might say that the comparison is not valid because the now alive people have no intention of stealing resources or harming the natural environment, and therefore there is no deceit. This defense of the present generations is not convincing because it is difficult now to find people who are unaware of the critical situation to which the Earth has been brought because of overpopulation and wasteful living standards.

In the history of the world, social problems have been solved or were limited to manageable proportion by command and by incentives (economic or otherwise) and by a combination of both.⁶ In principle, coercive measures should be avoided but since the world situation is critical and nothing else seems to have worked in reducing fast enough the size of population the idea of imposing restriction on the number of children per family should be seriously examined.

11.2 Country differences

With respect to population size the countries of the world can be separated in three groups: countries which are not overpopulated, those which are overpopulated with declining population, i.e. with total fertility rate below 2.1 births per woman, and countries which are overpopulated with growing population, i.e. with total fertility rate greater than 2.1.

According to one study⁷ there are six countries which can be said not to be overpopulated. These are Russia, Australia, USA, Canada, Ukraine and Argentina.

The countries with overpopulation but with low fertility rates are the countries of Europe with a TFR of 1.41, of Northern America with 1.59 TFR and the countries of Latin America and the Caribbean with 1.78 TFR.

The countries with overpopulation and high total fertility rates are the countries of Africa with a TFR of 3.96, the countries of Oceania with a TFR of 2.13 with the exception of Australia and New Zealand with TFR 1.64, and the countries of Central Asia (TFR 3.14), Western Asia (TFR 2.52) and Southern Asia (TFR 2.18). China and India have declining population with TFR 1.06 and 1.94, respectively.

The differences of total fertility rates among countries has created a dissension between North and South, that is, between countries with low fertility and countries with high fertility, and those who suggest measures for reducing fertility in Africa and Asia are accused of racism. This is only one of the reasons that make overpopulation a wicked problem.

12. Models for solving the environmental problems with no reference to population.

There are at least four theories (often presented as ideas or models) that promise, if applied, to solve the environmental problems. These are: ecomodernism, green growth, de-growth and ecosocialism.

12.1 Ecomodernism

⁶ A recent case in point is the command and incentives used for dealing with the covid pandemic.

⁷ Lianos and Pseiridis (2016)

Ecomodernists believe that there are no limits to growth and the environmental problems will disappear if the energy needed for the production of products is solar or nuclear energy. They also believe in absolute decoupling, i.e. that production can increase and at the same time the negative effects of production to the environment can decline. In their manifesto ecomodernists make clear that their views do not imply any political ideology. This is in contrast to the other views we present next.

It is certainly correct to say that termination of fossil fuels use in production would be a great improvement but carbon dioxide is not the only cause of environmental problems. Also, it is clearly wrong to believe that there are no limits to growth in a planet with limited resources. So far the optimism of ecomodernists is not supported by the facts. For example, there is no evidence of absolute decoupling.

From their belief that there are no limits to growth it follows that ecomodernists do not see problems coming from the increasing world population.

12.2 Green growth (Green economy)

Green growth and green economy mean the same thing: economic growth with efficient use of natural resources and production methods that minimize pollution will reduce the negative environmental impacts so that natural hazards and disasters are avoided. With green growth development will be sustainable and the future generations will enjoy a level of welfare at least as high as the present one.

Green growth can be the result of policies that promote investment (private and public) in green technologies, by removing subsidies for fossil fuels, by pricing negative externalities, by supporting the development of markets for green products, by better organization of cities (e.g. transportation and green buildings) etc.

It is true that the world economy is growing in terms of constant US\$ but the growth is not green. During the last twenty five years CO₂ emissions from fossil fuels increased from 25.3 billion metric tons in 2000 to 37.4 in 2024. It is interesting that during the last decade emissions per capita did not increase which means that the increase in the total came from increasing population. Also, during the twentieth century the global surface temperature increased by roughly 0.6^o C (1.1^o F), and during the twenty first century, from 2000 to 2024, temperature increased by 0.47^o C (0.84^o F), which means the global warming is accelerating.

The failure of the green growth model may be attributed to the failure of governments to apply the policies suggested by the model because of the resistance of organized groups opposed to these changes. Also, the green growth supporters, like the ecomodernists, seem to ignore that the resources of the planet are limited and GDP cannot grow indefinitely. As a consequence, they also do not recognize the size of world population as a source of problems.

12.3 De-growth

De-growth is theory and at the same time a political program that has two parts: first, it criticizes capitalism and second it suggests a different type of social organization. The de-growth critic of capitalism centers on the idea that capitalism as a “grow or die” system has an end because the limited natural resources set a limit to growth. De-growth advocates suggest reduction of GDP and of

consumption. To avoid unemployment that will follow GDP reduction they suggest job guarantee and work sharing schemes and also a basic income for all citizens.

In their own words "...degrowth signifies also a desired direction, one in which societies will use fewer natural resources and will organize and live differently than today. Sharing, simplicity, conviviality, care and the commons are primary significations of what this society might look like." The purpose is the "transition to convivial societies who live simply, in common and with less".⁸ In brief, this is how degrowth advocates see social change.

All this sounds nice but it is not clear how these societies will be organized. There are references to eco-communities, cooperatives and community currencies but this does not provide enough information with regard to the mechanisms that would allow these societies to function. De-growth has neither a well specified economic nor political model. It has no rules about income distribution or about political decision making.

In regard to the question of population degrowthers favor the idea of a voluntary restriction of procreation as a collective act of self-limitation, and reject any top-down policies for population control.⁹ Obviously, this position includes the danger of economic disaster if GDP declines and population does not reduce or grows at the same time.

12.4 Eco-socialism

Eco-socialists believe that the environmental problems are the result of the perpetual circle of production and consumption within the framework of the capitalist system. Capitalism and a sustainable future for the Earth do not go together. Operating under the pressure of the forces described by the "grow or die" motto capitalists pursue maximum profits without distinction between quantity and quality of the products they produce, by creating artificial and insignificant needs by means of huge expenses for advertising, and by ignoring the negative externalities of their production. In short, capitalism cannot offer a solution to the problems we now face.

According to eco-socialists the policies suggested by eco-modernists or by green growth and green economy may help but they offer no real solution because they cannot change the nature of capitalism.

According to eco-socialists the socialist system of the future will have three basic characteristics: (a) the political system will be democratic socialism, (b) a basic element of the economic policies will be full employment and equality and (c) decisions for major issues will be taken on the basis of popular vote.

As in all variations of socialism, eco-socialists have no place for population in their program. It seems that Marx's severe critique of Malthus makes it an ideological sin to even mention the size of population as a variable that should be examined for its effects on the economy. For socialists population is not a matter of concern neither in capitalism nor in socialism.

12.5 Comments

⁸ Quotations are from G. D'Alisa, F. Demaria and G. Kallis (2015).

⁹ Martinez-Alier. J. 2015. Neo-Malthusians in D'Alisa et al. (eds) *A vocabulary for a new era*, ch.27.

Environmental problems are scientifically and empirically documented. It is also undeniable that these problems stem from the increasing production of products and from exceeding the limits set by the planet we live on. The increase in production is due to the increase in the world population and the improvement of the standard of living worldwide as measured by per capita product. In the improvement of the standard of living, production technology was and remains crucial. Regardless of one's political ideology, the above cannot be disputed.

Over the past sixty years or so, the volume of production worldwide has increased to a degree that exceeds the limits set by the Earth's resources, resulting in the emergence of environmental problems that are constantly worsening and creating fears of irreversibility. Despite the central role of the growing population in production and, by extension, in the creation of environmental problems, supporters of capitalism as well as supporters of socialism refuse to correlate the size of the world's population with the severe problems we face today. Neoliberals and socialists place their hopes for improving the environment in technology. Socialists also believe that the fall of capitalism will automatically bring the solution to the problems. The omission by supporters of green growth and green economy to consider population size is completely understandable because capitalism can survive without a growing population, but it cannot grow. With a stable population, growth will come only from technological improvements. Like neoliberals, ecosocialists ignore the problem of overpopulation. They may believe that there is no such problem, or that, if there is, it will disappear when socialism takes hold. They may also fear that a program of population reduction will not be acceptable by the working classes.

13. A model with constant population: Steady-State Economy

The model of the steady state economy (SSE) is based on the idea that the resources of the Earth are limited and therefore economic growth cannot continue forever. The environmental crisis is evidence that the planetary limit have been crossed and therefore total production, i.e. GDP, should be reduced to sustainable proportions, but reduction of GDP without reduction of population would be disastrous and would result in more poverty and social unrest. Thus, GDP and population should decline together.

The steady-state economy has the following characteristics:

- There is private property of the means of production, i.e. of land and produced capital.
- The working and the coordination of the economy is based on the mechanism of the free markets.
- Population is constant at some chosen sufficient level.
- Production of goods and services is constant at some chosen sufficient level. Population and production are co-determined.
- Institutions are established to make sure that population and production stay at the chosen level. For that purpose some have suggested family planning, transferable birth license (Boulding, 1964), an international market for limited birth licenses per family (Lianos 2018), monetary benefits for small size families etc. To reduce persisting economic inequalities, minimum and maximum limits to personal income are recommended and also maximum limits to personal wealth.

Two questions arise immediately: how is the chosen population size determined, and how is the chosen production of goods and services determined? As we have already explained in a previous

section the level of production should be that which corresponds to ecological equilibrium, and the size of population should be that which corresponds to a comfortable standard of life. Of course, it is not easy to simultaneously determine the right population size and the right level of production, but generally speaking it is possible to find combinations of population and production that would be widely acceptable.

In a steady state economy the role of technology is very important because it can raise the efficiency of production and increase per capita product without disturbing ecological equilibrium.

Herman Daly (1991) has argued that what is needed now is moral growth rather than economic growth. Modern societies are conditioned to believe that economic growth is the ultimate goal. They rarely consider whether their aims are morally sound or rooted in meaningful values, prioritizing size over quality. In other words, economic growth often occurs without corresponding moral development. While economic growth relies on efficiency, moral growth depends on the pursuit of higher values.

One issue occasionally discussed in the literature concerns the social organization of the steady state economy. The central question is whether it can function as a capitalist economy or whether a socialist economy is necessary. Daly argued that the SSE is neither capitalist nor socialist but something different (Daly, 2010). Richard Smith states that since capitalism cannot exist without constantly expanding markets, a steady state economy cannot therefore be a capitalist economy (Smith, 2010), while in contrast Philip Lawn believes the opposite (Lawn, 2011). My own opinion is that the crucial characteristic of a SSE is ecological balance and stable population and therefore a SSE can be either capitalist or socialist (Lianos, 2021).

Finally, it should be said that reduction of population will not automatically solve the existing economic and social problems of the world but it is certain that the solution of the problems would be easier.

14. Why is overpopulation a wicked problem?

Overpopulation is a wicked problem for the following specific reasons:

- While solving environmental problems is urgent, population reduction will be slow. Even with one child per family, it will take decades to significantly reduce the population.
- In many countries of the world there is (in many cases) a justified bias in favor of large families. Changing this family pattern requires a lot of effort and great expense.
- The governments of various countries do not seem to be interested in encouraging reduction of population. On the contrary, in some countries efforts are being made to increase the birth rate.
- Political parties and political movements and the majority of those who are concerned about the state of the environment and climate change do not recognize overpopulation as a problem and rely on either technology or a change in the social system, that is, the fall of capitalism, to solve the problems.
- For the world as a whole the number of births per woman was 2.24 in 2024. There are 101 countries with more than 2.1 births per woman and all these countries are in Africa, Asia and South America. Because of this some people argue that efforts to limit the world population imply discrimination against peoples of these countries.

- There's another reason why overpopulation is a wicked problem. Not only is it big but it is projected to grow to 9.7 billion by 2050. This means adding 64 million people every year. Still worse, another 1.5 billion is projected to be added between 2050 and 2100 so that the global population will reach 11.3 billion at the end of this century.

If overpopulation is a serious wicked problem for which no solution is on sight the question that naturally comes to mind is “What next?” Before we can say something about the future it is necessary and useful to look at some data.

15. The prince and the pauper

It was shown on Table 1 that between 1970 and 2020 the world GDP has increased from 18.3 trillion to 82.7. This is a remarkable growth that has given to many the opportunity to become very rich while at the same time billions of people are left behind and live in poverty. According to a World Bank report¹⁰ in 2022 there were in the world 3574 million people were poor at 6.85 \$ (in PPP) per day. Among them there were 1783 million people at 3.65 \$ per day and 713 million at 2.15 \$ per day.

The world population in 2022 was 7.99 billion. Thus, 45% (3.574/7.99) of the world population are really very poor people. It is interesting to ask what will happen to the 1.6 billion people that will be added to the world population¹¹ in the next 25 years. In general, one may say that the answer depends on the opportunities they might have for good education, good health and good employment. However, there is nothing to guarantee that these opportunities will be available. An unpleasant feeling arises when one thinks that the resources of the earth are limited and fully utilized. Arable land, for example, is limited and in short supply if one considers that forests are burned to convert them into arable land.

According to FAO¹² “Land and water systems are managing to meet the demand placed upon them by an increasingly complex global food system driven by unrelenting population growth...There is little room for expanding the area of productive land...High levels of land and water use are stretching the productive capacity of land and water systems to the limit, and severely degrading land and environmental services in the process”.

In 2021, when the FAO report was published, the world population size was 7.9 billion. In 2050 it is predicted to be 9.7 billion increased by 20%. Will it be possible for the already fully utilized resources to increase food production by 20%? The message from FAO is clear: In the next two decades it will not be easy, perhaps impossible, to feed the population which is predicted to reach 9.7 billion.

16. What is next?

The increase of the world population by about two billion in a global economy that is fully utilizing its resources and already has 3.6 billion hungry people means only one thing: social unrest and by extension political instability and upheavals from which no one knows what will emerge and what changes will come. However, the consequences will not be the same for all countries. Some will lose a lot, others a little, and some will gain from the global turmoil.

¹⁰ Poverty, prosperity and Planet report, 2024.

¹¹ To be exact the addition of 1.6 billion is the new born minus the dead in the 2025-2050 period.

¹² FAO, 2021, p.58

The question that logically arises is this: are the powerful of this world, presidents, governors, generals, major economic actors, etc. blind? Do they not see the coming turmoil or do they simply think that it does not concern them and that they can only profit from the misery of the many?

References

- Boulding, K. (1964). *The Meaning of the Twentieth Century*, Harper and Row, NY.
- Boulding, K. (1966). The Economics of the coming spaceship Earth in H. Jarrett(ed.) *Environmental quality in a growing economy: Resources for the future*, Baltimore, MD Johns Hopkins Univ. Press, pp. 3-14.
- Daly G.C. Ehrlich A.H. and Ehrlich P.R. (1994). Optimum human population size. *Population and Environment* 15(6): 469–475. DOI: 10.1007/BF02211719.
- Daly HE (1968). On Economics as a Life Science. *Journal of Political Economy* 76(3). The University of Chicago Press: 392–406. DOI: 10.1086/259412.
- Daly HE (1972). In Defense of a Steady-State Economy. *American Journal of Agricultural Economics* 54(5): 945–954. DOI: 10.2307/1239248.
- Daly HE (2019). Growthism: its ecological, economic and ethical limits. *Real World Economics Review* (87), pp.9-22.
- Daly HE (1991). *Steady-State Economics*. 2nd ed. with new essays. Washington, D.C: Island Press.
- D' Alisa, G., F. Demaria and G. Kallis (eds), *Degrowth: A vocabulary for a new era*. Routledge 2015 pp. 3 and 11.
- Dasgupta, A. and P. Dasgupta (2017). Socially embedded preferences, environmental externalities and reproductive rights, *Population and Development Review* 43(3):405-441 (September).
- Ehrlich PR (1968). *The Population Bomb*. New York: Ballantine Books.
- Ehrlich PR and Holdren JP (1971). Impact of Population Growth. *Science* 171(3977). American Association for the Advancement of Science: 1212–1217. DOI: 10.1126/science.171.3977.1212.
- Georgescu-Roegen, N. (1975). Energy and economic myths, *Southern Economic Journal* v.41, no. 3 pp.247-381.
- Georgescu-Roegen, N. (1971). *Entropy law and the economic process* Harvard Univ. Press, Cambridge Mass.
- Lawn, P. (2011). Is steady-state capitalism viable? A review of the issues and an answer in the affirmative, *Annals of the New York Academy of Science* 1219, 1-25. <https://doi.org/10.1111/j.1749-0632.2011.05966>.
- Lianos T. P. and Pseiridis A (2016). Sustainable welfare and optimum population size. *Environment, Development and Sustainability* 18(6): 1679–1699. DOI: 10.1007/s10668-015-9711-5.
- Lianos T. P. (2018). Steady State Economy at Optimal Population Size. *Journal of Population and Sustainability* 3(1): 75–99. DOI: 10.3197/jps.2018.3.1.75.
- Lianos T. P. (2021). Is a capitalist steady-state economy possible? Is it better in socialism? *Real World Economics Review* (95): 2–10.
- Martinez-Alier. J. 2015. Neo-Malthusians in D' Alisa et al. (eds) *A vocabulary for a new era*, ch.27.
- Meadows DH, Meadows DL, Randers J, et al. (1974). *The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind*. 2. ed. New York: Potomac Associates - Universe Books.
- Pimentel D, Harman R, Pacenza M, et al. (1994). Natural Resources and an Optimum Human Population. *Population and Environment* 15(5). Springer: 347–369.
- Rittel, H. W. J. and M. M. Webber (1973). Dilemmas in a general theory of Planning, *Policy Sciences* 4:155-169.
- Smith, R. (2010). Beyond growth or beyond capitalism, *Real World Economics Review*, 53, 28-42.

Author contact: tplianos@aueb.gr

SUGGESTED CITATION:

Theodore P. Lianos, "ECONOMICS 100: Overpopulation is a wicked problem", *real-world economics review*, issue no. 112, December 2025, pp. 2-20, <http://www.paecon.net/PAERReview/issue112/Lianos112.pdf>

You may post and read comments on this paper at <http://rwer.wordpress.com/comments-on-rwer-issue-112/>

The Transformational Role of Artificial Intelligence in the Pursuit of Good Economic Governance

Constantine E. Passaris

[University of New Brunswick, Canada]

Copyright: Constantine E. Passaris, 2025
You may post comments on this paper at

<http://rwer.wordpress.com/comments-on-rwer-issue-no-112/>

Abstract

This paper explores the ascent of Artificial Intelligence (AI) in the context of the new global economy of the 21st century and the cataclysmic superfecta of the first three decades of the new millennium. Humanity is on the cusp of a transformational innovation that can transform the mission and mandate of economic governance. It examines how AI can align economic governance with the challenges and opportunities of today's rapidly evolving economy. It highlights the integration of AI to enhance the effectiveness of economic policies and proposes strategies to harness its immense potential for redesigning economic governance with the overarching objective of optimizing efficiency while mitigating associated risks. Central to this proposal is the redesign of economic governance based on six guiding principles: efficiency, equity, effectiveness, endurance, empathy, and empowerment. This paper explores the intersection of AI and economic governance, addressing contemporary opportunities and threats, and introduces a framework for economic policy enhanced by the capabilities of AI.

Keywords: Artificial Intelligence (AI), internetization, economic governance, economic policy.

Introduction

Artificial Intelligence (AI) represents a monumental scientific and technological innovation. In effect, AI is an extension and the contemporary face of spectacular innovations for humanity's journey on the spectrum of historical continuity. It is clearly a game changer for the scope and substance of economic governance and may turn out to be the most revolutionary tool for the construct of economic policy. AI has the capacity to push conventional boundaries, integrate leading edge technology, explore new frontiers for economic governance, and contribute new ideas and new paradigms. In effect, we are on the cusp of a transformational innovation and a new public policy paradigm that has profound and impactful consequences on the economic landscape. AI can redefine the architecture of economic governance and create a new template for economic policy.

There is no denying that AI is redefining the economic, social, and political landscape in a profound and indelible manner. AI is reconstructing the production function, pivoting human capital, replacing human tasks, creating new social parameters, reshaping economic governance, empowering educational capacity, and enhancing the speed of communication. AI is increasingly shaping the world around us, changing how industries operate and deliver products and services, creating new jobs,

contributing to work obsolescence, revolutionizing public services in healthcare and education, and influencing public opinion. The past decade has witnessed an exponential rise in the sophistication of AI methods, including the widespread popularity of Large Language Models (LLMs) and their use by business, governments, and individuals.

In effect, AI is creating a new technological orbit by facilitating new scientific and technological innovations, advancing the frontiers of medicine and healthcare, reorganizing the economic landscape and using social media to influence public opinion. The foremost beneficiary of the contemporary wave of AI is Large Language Models (LLMs) and their deployment by individuals, social networks, advocacy groups, non-governmental organizations, business and governments. In short, AI is at the forefront of scientific discoveries, medical advances, product innovation, social change, public policy evolution, systems improvement, and technology incubators. It has promoted new ideas, new paradigms, social transformation, and breathtaking inventions.

However, AI's sweeping impact, also requires policy and governance frameworks that can provide societal security and safety with respect to AI's development and deployment. The pace of AI regulation in Canada has lagged international mileposts such as the European Union AI Act (European Union, 2024). Calls to accelerate the pace of AI regulation in Canada have come from civil society, academia, government and the information and communication sector. There is an urgency to fill the existing gaps in public policy, regulatory frameworks, and governance mechanisms regarding AI safety in Canada. All this for the purpose of introducing policy guardrails to confront the technical risks related to AI. This includes short-term and long-term risks of AI through the formulation of governance regulations on AI safety. The range of AI's systemic risks include AI's impact on the labour market, digital divide, market disfunction, environmental concerns, privacy, and copyright legislation. (Bengio et al, 2024).

New Economy

The new global economy of the 21st century has transformed the economic, social, and digital landscape in a profound and indelible manner. Never in human history has the pace of structural change been more rapid, pervasive, and global in its character. The ascendance of the new economy has become a catalyst for geopolitical symbiosis, economic integration, enhanced trade, technological change, financial interdependence, and a heightened awareness of the adverse economic consequences of climate change. Furthermore, the signature mark of the new economy is new ideas, new technologies and new directions. In effect, the fuel of the new economy is technological advances, and its currency is human capital. The product of the new economy is knowledge, and its catalyst is the Internet. The engine that is driving the new economy is transformational change, human capital and spectacular innovations.

The new economy is composed of a trilogy of interactive forces that include globalization that has morphed into internetization, global trade and the information technology and communication revolution. Internetization is a new word and concept that I have coined to describe the electronic empowerment and global outreach of the new global economy of the 21st century (Passaris, 2021). Indeed, internetization is a more compelling operational descriptor for the contemporary economic and social landscape than globalization. Internetization spotlights the foundational role of innovation and scientific advances for the economy and civil society. Furthermore, internetization extends global linkages by simultaneously embracing electronic connectivity and global outreach. It captures the pervasive influence of technological change on the global economy and all aspects of human

endeavour for contemporary civil society. Indeed, internetization has become a catalyst for transformational change, economic empowerment, and personal communication on a global scale (Passaris, 2024A). AI is the contemporary face of internetization. In addition, global trade has enhanced global economic integration and extended the economic architecture. The Information Technology (IT) Revolution has made geography and time irrelevant by diminishing distance and accelerating connectivity. All these pillars of the new economy are driven by a virtually borderless world with a tremendous capacity for electronic connectivity.

The economic profile of the new global economy has been driven by technology, fueled by innovation, and propelled by new ideas, new perspectives and new business strategies. It has opened the door to new investment opportunities and realigned the linkages between different sectors of the economy. The role of information and communications technology in the new economy has been pivotal. This is particularly true of the changing structure of international production and global networks where firms are integrating the production and marketing of goods and services across national borders. International economic transactions that formerly were conducted between independent entities are now being internalized within a single firm or multinational corporation. The new technological infrastructure has enabled services to be delinked from production and performed remotely. In this contemporary venue the market for a growing number of internationally integrated but geographically dispersed business enterprises is global rather than national. Indeed, the collapse of time and geography through internetization has displaced the physical market with the virtual market of the Internet for business to business and business to consumer transactions. Innovation has empowered the new economy to reach greater heights of global outreach and form new international economic linkages.

Innovation is the signature mark of the new global economy of the 21st century. This reflects the fact that the old economy of the 20th century was about the resources under our feet. In sharp contrast, the new economy of the 21st century is about the brain power between our ears. Furthermore, the engine that is driving economic success in the contemporary context is innovation. There is no denying that innovation has become an essential prerequisite and a core catalyst for economic success and collective prosperity in the modern economy of the 21st century.

At the present time, we are on the cusp of a new wave of innovations related to AI. AI has triggered monumental structural changes on the economic landscape. Already, it is having impactful consequences on production, employment, public services, education, healthcare, and workplace skills. Furthermore, AI will continue to impact in a profound manner the economy, business, the private sector, the public sector, and civil society. There is no denying that AI will create significant benefits and new opportunities. It will also create new challenges, risks, and malfeasance on many fronts. In consequence, it will require a modern response from economic governance and economic policy.

Cataclysmic Superfecta

The first three decades of the 21st century have unleashed a cataclysmic superfecta. Starting with the global financial crisis of 2008 which adversely affected financial institutions worldwide. This was followed by the protracted Great Recession which triggered a sharp decline in economic growth accompanied by high levels of unemployment. In the third decade, COVID-19 created a global tsunami of economic devastation and an asymmetric economic impact between countries (Passaris, 2024B).

Furthermore, throughout the decades of the new millennium, humanity has witnessed the progressive deterioration of the environment and the decline of biodiversity. The ensuing natural disasters have

resulted in the loss of human lives and economic assets. Climate change is causing significant environmental, economic, social, and human harm nationally and internationally. Increases in average global temperatures are precipitating longer droughts as well as increasing the frequency and severity of heat waves. They are also causing extreme weather events and natural disasters like destructive floods, residential area wildfires, forest fires, environmental storms, sea level rising, and have brought our ecosystem to the brink of collapse.

More recently, geopolitical tensions have accelerated on a global scale. This is evidenced by the current military conflicts in the Ukraine and the Middle East which have precipitated supply chain disruptions, product shortages, and global inflationary pressures. The major economic issues confronting humanity in the third and subsequent decades of the 21st century are global in character and context. In consequence, our contemporary challenges require a multilateral approach and global solutions.

The contemporary hot button economic issues facing humanity require a concerted effort to develop a new economic governance model and an improved economic policy mandate. There is an urgent need to develop a tripolar economic policy formula that integrates an economic, social, and environmental dimension. The days when economic policy, social policy, and environmental policy were developed on separate tracks and in isolation of each other are behind us. The future requires that economic governance recognizes the complementarity and synergies between these policies and addresses them within a holistic paradigm. In effect, the current economic governance architecture was designed for the old economy of the 20th century and has proved ineffective and inadequate for the new economy of the 21st century.

All of this underlines the fault lines and vulnerability of our contemporary economic governance architecture and the potency of our economic policy. In addition, the 21st century has underlined the speed of structural change and spectacular innovations. This is the context that precipitated the ascent of AI in the 21st century. In effect, we are on the cusp of a transformational innovation that has the capacity to empower spectacular advances in pushing conventional boundaries, exploring new scientific frontiers, reimagining economic governance, and enhancing the efficacy of economic policy.

Governance Antecedents

Over the centuries, the evolution of economic governance has undergone significant transformation in response to the introduction of new economic theories, structural change, political ideologies, and global developments. The modern trajectory of economic governance started with classical economics in the 18th century. Adam Smith, the founder of modern economics and the author of “An Inquiry into the Nature and Causes of the Wealth of Nations” (Smith, 1776) laid the groundwork for economic governance in the latter part of the 18th century. His philosophy of the “invisible hand” and free enterprise advocated the absence of government intervention in the economy. Laissez faire was the theoretical anchor that empowered the private sector as the principal engine for economic growth and the sole decision maker in economic matters. In effect, classical economists believed that free markets, driven by the private sector’s pursuit of self interest, would result in the efficient allocation of resources and collective prosperity. In this scenario, there was no need for government intervention in the economy. In consequence, free enterprise served as the paramount economic governance model until the Great Depression of the 1930’s.

The Great Depression of the 1930's lasted over a decade and had a devastating impact on the economic landscape. As a direct consequence of the Great Depression a new model for economic governance was introduced by John Maynard Keynes with the publication of his book "A General Theory of Employment, Interest and Money" (Keynes, 1936). Keynes challenged the efficacy of economic governance in the context of the laissez-faire approach. Unlike Smith's philosophy of no government intervention in the economy, the advent of Keynesian economics in the latter half of the 20th century opened the door for government's engagement with economic affairs. Keynes proposed that during an economic downturn, it was necessary to have government intervention in the economy for the purpose of stimulating demand and reducing unemployment. Keynesian economics also laid the foundations for the welfare state. In consequence, Keynes created a template for a mixed economy which embraced a compounded form of private sector and public sector economic decision making. Its implementation required a more affirmative economic role for government through the intervention of monetary and fiscal policies to stabilize economies.

In the aftermath of the second world war, governments around the world embraced Keynesian economics for the purpose of pursuing policies of full employment, price stability, and economic growth. They introduced a social safety net for protecting marginalized and vulnerable citizens. However, the 1970's created new economic governance challenges in the form of stagflation which was the simultaneous emergence of high inflation and unemployment. Stagflation challenged the conventional prescriptions of Keynesian fiscal and monetary policy to remedy the fluctuations of the business cycle. In consequence, the 1980's recorded the ascent of neoliberalism which was spearheaded by economists such as Milton Friedman (1951) and Friedrich Hayek (1944) who proposed a return to a free-market economic policy. In essence, neoliberalism underlined the importance of deregulation, privatization, and diminished government intervention because free markets were more efficient in allocating resources and fostering economic growth.

The advent of globalization towards the latter part of the 20th century enhanced free trade opportunities around the world and underlined the important role of multilateralism in economic governance. The surge in economic integration and interdependence also created new challenges and paradigms for economic governance. In this regard, Douglass North (1990) and Oliver Williamson (1985) pioneered the New Institutional Economics (NIE) which provided a new formula for economic governance that required robust legal and regulatory frameworks to support markets, reduce transaction costs, and protect property rights. In short, NIE was designed to provide a scaffolding for economic governance at a time of increased global economic integration by providing the economic governance ecosystem with protections against international economic malfeasance. The IT sector and intellectual property rights were direct beneficiaries of this initiative.

The sudden and unforeseen global financial tsunami of 2008 and the ensuing Great Recession revealed the fissures and fault lines in neoliberal economic governance and triggered a renewed interest in government intervention and regulatory oversight. In effect, introducing a renovated form of Keynesian economics and more resilient financial regulation to prevent future economic crises. In addition, new challenges for economic governance included the economic consequences of the COVID-19 pandemic, climate change, sustainable development, economic inequality and digital transformation. All this prompting new conversations regarding enhancing economic resilience and putting in place guard rails that will ensure good economic governance in managing public health, education, economic growth, and social wellbeing.

Throughout this journey, economic governance has responded to the evolution of economic theory, policy, and global developments. From classical economics, Keynesianism, neoliberalism,

globalization, and the new institutional economics, each phase has reimagined and remodeled economic governance in response to defining mileposts in economic theory, policy, shocks to financial stability and economic growth. Navigating the complexities and challenges of the ensuing decades of the 21st century will require economic governance to continue to adapt, reform, renovate, and respond to new challenges and opportunities.

The ascent of AI in the 21st century is on the cusp of triggering another course correction in economic governance. Indeed, AI is reshaping the economic landscape and creating profound structural change. All this in the context of the ascent of the new global economy, the lessons learnt from the cataclysmic *superfecta* and the empowerment of AI. Indeed, the contemporary economic challenges facing humanity during this decade is the right time for reimagining economic governance for the purpose of enhancing its efficacy and modernizing its potency for the 21st century.

Economic Governance

An appropriate definition of economic governance is the multi-dimensional aspects of direction and policy that impact on the economy including the machinery and institutional architecture for the delivery of economic governance initiatives. Good economic governance should not be perceived as a static concept. In effect, good economic governance should evolve to accommodate the structural changes on the economic, social, and environmental landscape. Clearly it is a concept that is not only time sensitive but also responsive to societal permeations. Dixit points out "that different governance institutions are optimal for different societies, for different kinds of economic activity, and at different times. Changes in underlying technologies of production, exchange and communication modify the relative merits of different methods of governance" (Dixit, 2008: 673).

The structural changes on the economic landscape during the last three decades have underscored the need to develop a public policy framework that simultaneously embraces economic development, social cohesion, technological change, and environmental sustainability. As such institutions of governance should recognize the interdependent, complementary, and multidimensional nature of public policy variables. The contemporary challenges facing civil society and national economies are redefining the new parameters for public policy. Public policy can no longer be segmented, compartmentalized, and developed in silos. The modern context requires elevating the mission of public policy to a different formulaic structure that embraces a multidimensional context and an interdependent perspective. In consequence, we need to construct an integrated public policy ecosystem that confronts the challenges and embraces the opportunities of the 21st century.

The modern face of economic governance should have a pronounced global mindset. International economic events have national repercussions and national economic policies trigger international consequences. Global economic interdependence is a fact of life in the 21st century and our institutions of economic governance need to adapt and evolve to embrace it rather than ignore its existence. In this journey, collaborative multilateralism is the pathway that will resolve our contemporary hot button issues which are global in character and composition. Acknowledging our global interdependence is a precondition to the resolution of the contemporary challenges facing humanity. In consequence, we need to develop an economic governance multilateral framework and a strategic implementation plan that deploys new economic, social, and environmental governance initiatives.

AI can facilitate the modern make-over of economic governance. More precisely, AI has the capacity to enhance the transparency and accountability of economic governance. Electronic connectivity and digital transparency facilitate public accessibility to government documents and governance decisions. Furthermore, they allow a heightened level of public scrutiny and facilitate public input in governance decision-making. In effect, AI can improve the efficacy of the two-way communication system between government and civil society. All of this, for the purpose of creating a modern template for economic governance that is congruent with inclusive participation, efficient governance and reflects the aspirations of civil society.

Redesigning Governance

The overarching mission of this paper is to develop an innovative blueprint for economic governance that is empowered by the ascent of AI. A new economic governance template that is congruent with the structural changes and technological innovations that were precipitated by the new global economy of the 21st century. In addition, a new economic governance blueprint that embraces the lessons learnt from the cataclysmic superfecta and is informed by the principles of good governance. In redesigning economic governance, we need to adopt a new vision, embrace an innovative formula, and promote a global mindset. In effect, redesigning economic governance and charting a new course for economic policy allows a window of opportunity for replacing the old and ineffective economic governance methods with new and more potent initiatives.

The process of reimagining economic governance may result in the restructuring of existing institutions through a process of renewal and institutional innovation. It may also take the form of designing new economic institutions that are more synergistic with the structural changes brought about by the new economy. In some cases, existing institutions of economic governance only need to be renewed and remodelled while in other cases, there is a need to build new institutions.

In the modern context, creating synergies for economic governance is imperative to ensure their operation in a cost-effective manner and to achieve the desired economies of scale. All of this while adopting a holistic and comprehensive approach that effectively integrates the deliverance of governance outcomes. In addition, technological advances in information and communications have reformatted the scope and substance of economic governance. They have enhanced the interchange between civil society and public institutions and created a higher standard for transparency and accountability. In effect, they have enabled civil society to hold governments accountable to a higher standard than at any time in the past.

Furthermore, the invasive nature of modern technology has also resulted in exposing digital vulnerabilities and the need for cybersecurity measures. This will require modernizing the machinery of governance and creating a new modus operandi for economic governance in the 21st century. In essence, the structural qualities and resilient infrastructure of the modern economic governance architecture must be able to withstand future external economic shocks, digital threats, and interface effectively with the new global economy.

The redesign of economic governance should adhere to a new dynamic in the form of the confluence of government, the private sector, labour unions, and non-governmental organizations in redefining the scope and substance of its mission. This new model of economic governance can serve as a purposeful catalyst for forming effective partnerships that contribute to positive change and better outcomes. A re-engineered model for economic governance should be adept, nimble, and equipped

with the policy tools to deal with contemporary issues that are multifaceted in their genetic composition and global in their context. In consequence, the economic institutions of the 21st century and the machinery of economic governance should have the capacity to develop public policy and implement informed solutions in a manner that is proactive, inclusive, synergistic, and comprehensive.

The pursuit of economic governance in the 21st century requires a new vision, a modern mandate, and a purposeful strategy. I propose six principles to guide the process of redesigning economic governance that include the empowering capacity of AI. The 6E's of modern economic governance are: efficient, equitable, effective, enduring, empathetic, and empowering.

Efficient refers to the foundational economic pursuit for achieving favourable objectives of economic governance despite resource and financial constraints through a cost-effective formula. This includes the efficient delivery of public services, sound fiscal management, and the pursuit of economic policies that contribute to sustainable development. AI has tremendous capacity to achieve this outcome. Equitable invokes the axioms of fairness and inclusion. It requires a new paradigm that will achieve an equitable distribution of economic growth to all segments of civil society, reducing income disparities, providing equal opportunities to all citizens, and promoting social cohesion. AI's capacity to process big data and analyze the efficacy of different options is uniquely suited to assist with this task. Effective refers to the efficacy of economic governance institutions, the machinery of economic governance and economic policy to achieve the desired outcomes, by eliminating waste, reducing bureaucratic red tape, and enhancing productivity. Effective economic governance nurtures a financial environment that fosters investment and economic growth. AI can contribute to making economic governance more effective by improving decision making, enhancing efficiency, and promoting transparency and accountability.

Endurable refers to the resilience of institutions of economic governance to withstand external economic shocks and deter digital vulnerability. This is particularly appropriate in the contemporary implementation of AI which empowers the economic landscape with spectacular opportunities and at the same time develops significant threats. Empathetic is the modern version for the social safety net that resonates in the context of the recent cataclysmic superfecta. It provides governments with the mandate to support the most vulnerable in society as well as protecting the private sector during an economic downturn. AI can assist in updating the social safety net as well as renovating and modernizing the touch points of vulnerability and marginalization within the modern context. Empowering economic governance embraces transparency and accountability for the purpose of enhancing the efficacy of decision making. Facilitating the public's reach for information, understanding policy decisions, building trust, reducing corruption. It also serves as a conduit for building bridges and forming partnerships to achieve the economic goals and aspirations of civil society. Nothing speaks more to the empowerment of economic governance with AI than its predictive capacity to identify and confront future economic crises.

These six principles of modern governance will assist in redefining the role, functions, and the modern mission of economic governance. They will facilitate the process for conceptualizing a new structural framework for economic governance and a modern institutional architecture. Furthermore, they will serve as a catalyst for ensuring that economic governance will generate enlightened and visionary public policy. In addition, it will facilitate the strategic implementation of economic programs as well as building an effective and efficient machinery for the delivery of good economic governance. In consequence, the 6E's of economic governance will modernize the mission and mandate of economic governance and its accompanying institutional architecture as well as re-aligning its purpose with the contemporary economic realities. At the end of the day, this will contribute to a new conceptual

framework for economic governance that will transform the economic governance architecture, the machinery of economic governance and the scope of economic policy. All this with the overarching empowerment of AI and its strategic positioning to enhance the efficacy of contemporary economic governance.

Malthusian Trap

In charting a course that embraces AI in the modern mission and mandate of economic governance we should avoid falling into the Malthusian trap. Thomas Malthus was an 18th century economist and demographer who predicted the demise of humanity because population would increase at a geometric rate while food supply would increase at an arithmetic rate. In consequence, the food supply would be insufficient to meet the consumer demand triggered by an increasing population. What he failed to account for was the positive contributions of scientific advances, groundbreaking inventions and innovative agricultural machinery that would enhance agricultural productivity and increase the food output of the agricultural sector.

The Malthusian trap could become a reality for economic governance if we do not embrace AI as a unique opportunity to advance the pursuit of good governance in the 21st century. We should focus on AI's capacity to be a positive and constructive changemaker for policy makers. Simultaneously we should confront the potential threats of AI by adopting visionary policies and putting in place firewalls and guardrails to prevent AI's malfeasance. To avoid a Malthusian moment, economic governance should embrace this spectacular innovation and strategically position AI in their mission. Mindful of the fact that AI can empower a transformative paradigm for economic governance and enhance its efficacy. Governments should serve as a role model and embrace the integration of AI on the economic landscape for the purpose of promoting economic growth and prosperity.

In this regard, our historical compass should point towards the benefits of incorporating AI in our modern economic governance model. It behooves us to refresh our memories regarding those landmark inventions that have created a huge footprint in our economic journey. Inventions that have contributed to economic growth and raised the standard of living for billions of people around the world. More specifically, these innovations have included the Industrial Revolution in the 18th century, the invention of the steam engine and railway locomotives in the 19th century, the introduction of steel, electricity and automobiles in the 20th century, and the advent of the IT Revolution in the 21st century. These technological advances should serve as our North Star in determining the appropriate use of AI for economic governance. All these technological advances had one very important common thread and that was to make a positive impact on the economic landscape. The ascent of AI serves as a pivotal moment for economic governance and an opportunity to avoid the Malthusian trap. Economic policy should support and nurture technological innovations. For it is through innovation that we can achieve enhanced productivity and sustainable economic growth.

AI in Governance

AI has the capacity to process vast, comprehensive, analytical, and computing capacity beyond the capabilities of a single human brain. It relies on algorithms and systems to perform generative human tasks. It is capable of processing big data, archiving our cumulative knowledge and best practices, identifying patterns, making predictions, automating repetitive tasks and pivoting on Large Language Models (LLM) to achieve desired outcomes. Creating a road map for the purpose of harnessing the

full potential of AI will create synergies for economic governance. This should be accomplished by deploying the unique potential of AI in a responsible, ethical, and safe manner. Furthermore, AI opens new opportunities for synergistic complementarity and collaboration between the public, private and voluntary sectors in the pursuit of effective outcomes.

In consequence, economic governance must develop a modern template for harnessing the transformative potential of AI. At the same time, it should navigate a cautious approach towards utilizing its full potential while at the same time minimizing its risks. As such economic governance should serve as a role model in empowering the full potential of AI while simultaneously mitigating the threats associated with it. In addition, the public sector should implement public policy initiatives that create the appropriate regulations and guardrails for ensuring the ethical and responsible use of AI in a manner that mitigates risk and malfeasance.

AI has the potential to become a game changer for economic governance. It can create empowering opportunities along with unique challenges. Its benefits include enhancing the decision-making process, improving the efficiency of public administration, and integrating state-of-the-art innovation in the public sector. More precisely, AI's capacity to process big data, facilitate economic analysis, create outcome scenarios extends the boundaries for evidence based economic policy. In effect, AI algorithms can analyze vast amounts of economic data, identify patterns, and generate insights that inform policy decisions. In this manner assisting policymakers to understand economic trends and make evidence-based decisions.

AI can be used to create predictive models that forecast economic outcomes, such as GDP growth, inflation rates, and employment trends. This allows governments to anticipate challenges and develop proactive strategies. AI can assist in optimizing resource allocation by identifying the most efficient ways to distribute human and financial resources for public services, economic development, infrastructure projects, and social programs. AI-powered systems can be used to detect and prevent fraudulent activities in economic transactions, such as tax evasion, money laundering, and financial fraud. Furthermore, AI can assist in monitoring and ensuring compliance with economic regulations, reducing the risk of non-compliance and improving overall governance. AI has the capacity to gauge and analyze public opinion for the purpose of advancing democratic governance. In effect, Natural Language Processing (NLP) algorithms can analyze public sentiment and feedback from social media, surveys, and other sources, providing policymakers with real-time insights into citizens' needs and preferences.

AI can support the development of economic policies by simulating different scenarios and evaluating their potential impact, helping policymakers choose the most effective solutions. The importance of a global mindset for the contemporary exercise of economic governance is of the utmost importance. AI can facilitate multilateral coordination and international cooperation by providing tools for analyzing global economic trends and identifying areas for collaboration. All in all, AI enhances the efficiency, accuracy, and effectiveness of economic governance by enabling governments to make better-informed decisions, allows a proactive approach for economic governance, and respond more quickly to economic challenges.

AI Threats

In assessing the economic threats associated with AI and its role in economic governance we should be mindful of the Malthusian trap. Along with empowering AI, we should simultaneously prevent its

deleterious capacity for malfeasance. In effect, we should embrace the transformative potential of AI and navigate a cautious approach towards utilizing its full potential. All the time minimizing its risks and threats to economic policy and the economy. In effect, the most appropriate course of action is to mitigate the perceived threats rather than prevent the use of AI. This can be accomplished by creating safeguards, enforcing guardrails, building trust, and enforcing accountability. More specifically, legislation, policies, and guidelines should be developed to firewall the perceived threats. There is no denying that at the present time, AI has outpaced the oversight required for safety, security, privacy, confidentiality and enforcing intellectual property rights. The reason being that the speed of structural change and the evolution of AI in the form of new technologies and operational systems are ahead of public policy and government oversight (Legislative Assembly of Ontario, 2024).

A collateral threat for the implementation of AI in economic governance is the digital divide. This divide manifests itself within as well as between countries. It creates a chasm between those segments of society that have access to electronic capacity and those who do not. Similarly, AI accentuates the digital disparity between the countries of the Global North and the Global South. The most challenging economic threat to the implementation of AI is the creation of structural unemployment. This will require new employment policies to upskill or reskill unemployed workers for the emerging new jobs of the 21st century. In this regard, the contemporary structural changes in the economy and the evolution of the workplace necessitate new skills and technological competencies. The rise of AI is reshaping labour markets by creating a demand for new skills, prompting a re-evaluation of workforce training and a reimagining of the role of human labour in the production function.

There is no denying that AI will remain an influential force and play an increasing role on the economic landscape in the future. However, human oversight and critical thinking over AI, remains a sine qua non for the purpose of overcoming threats, biases, inaccuracies and ethical lapses in its operational performance. At the end of the day, we should also be mindful that economic governance empowered by AI can serve as a catalyst for facilitating higher levels of productivity and spurring on economic growth and prosperity.

Economic Policy

Economic policy is a foundational aspect of governance. AI offers a plethora of benefits in economic governance by revolutionizing the way governments manage the economic system. Indeed, AI has the capacity to empower the modern formulation and implementation of economic policy. By strategically using the vast storage capacity, automating processes, and improving efficiency, AI can reduce operational costs and enhance efficiency in economic administration. This allows governments to allocate scarce resources more effectively. In addition, it facilitates developing different economic scenarios, options, and implementation strategies. One of the foremost benefits of AI is its capacity to synthesize and use big data to enhance the predictive capability of economic policy. In effect, pivoting from a reactive public policy to a proactive approach.

More specifically, AI impacts economic policy on many levels and in different dimensions. AI can analyze extensive datasets, enabling policymakers to make informed decisions based on big data and trends. In consequence, AI enables policymakers to make data-driven decisions by analyzing vast amounts of economic data. This enhanced capacity in evidence-based decision-making leads to more accurate, informed and effective economic policies. Furthermore, AI provides real-time analysis and insights into economic trends and developments. This allows governments to respond quickly to changing economic conditions and make timely adjustments to policies. During economic crises, AI

can provide real-time data and actionable insights to help governments respond effectively. Recognizing that on the contemporary economic landscape one size does not fit all, AI can serve as a catalyst for customizing economic policy to address individual as well as collective needs, allowing for the creation of more tailored and effective economic policies and services.

AI has the capacity to automate routine tasks and processes, increasing efficiency and productivity in economic governance. By automating processes and improving efficiency, AI can reduce operational costs in economic governance and allocate resources more effectively. Furthermore, this allows human resources to focus on critical thinking and more strategic and complex tasks. AI can enhance the predictive analysis of economic policy because AI models can forecast economic outcomes and potential risks, helping policymakers anticipate future challenges and opportunities. AI can forecast economic trends and potential risks, helping policymakers anticipate and mitigate economic challenges. This proactive approach leads to more stable and resilient economies. In addition, AI can simulate various policy scenarios and their potential impacts on the economy. This helps policymakers evaluate the effectiveness of different policy options before implementation. AI can optimize taxation systems by identifying inefficiencies and suggesting improvements. It can also assist in allocating public expenditures on government programs and services in a more effective manner by analyzing the impact of different spending strategies. AI can identify and prevent fraudulent activities in economic transactions, such as tax evasion and financial fraud. This enhances the integrity and transparency of economic systems.

The contemporary economic landscape is defined by rapid structural change, breathtaking innovations and a redefined production function. All this increases the need for informed labour market analysis and labour force forecasts for policy makers to make decisions regarding the appropriate composition of work force education, workplace skills and technological competence. AI can analyze labour market trends and predict future demands for specific skills that are aligned with the introduction of new products and services. In turn, this information can inform policies related to education, training, and employment-readiness to ensure that the contemporary workforce has the appropriate mix of human capital that meets the labour markets future requirements.

AI can monitor and analyze financial markets, detecting early signs of instability or looming crises. This allows policymakers to take pre-emptive action to maintain financial stability. AI can provide oversight and ensure that economic policies and regulations are being followed by businesses and individuals, reducing the risk of non-compliance. In effect providing oversight in order that economic policies and regulations are enforced by monitoring compliance and identifying potential violations. AI can analyze public sentiment and feedback, helping policymakers understand the needs and preferences of citizens. This allows for more inclusive and responsive economic policies. AI can facilitate international economic cooperation and coordination by providing tools for analyzing global economic trends and identifying areas for collaboration among countries. This helps resolve global economic challenges more effectively through a multilateral decision-making formula. In effect, AI enhances the effectiveness, efficiency, and responsiveness of economic governance, leading to more informed decisions, better resource allocation, and improved overall economic performance. By leveraging AI, governments can develop more effective and efficient economic policies that promote sustainable growth and financial stability.

Even though AI can empower the efficacy and reach of economic policy, it comes with an array of risks and threats. These include AI systems can inadvertently perpetuate and amplify existing biases if they are populated with biased data. This can lead to unfair or discriminatory outcomes in economic policies and decisions. AI algorithms can be complex and opaque, making it difficult to understand how

decisions are made. This lack of transparency can undermine trust in AI-driven economic policies and hinder accountability. AI systems often require large amounts of data, which can include sensitive personal information. Ensuring the privacy and security of this data is crucial to prevent misuse and breaches. The automation of tasks through AI can lead to job displacement and obsolescence, particularly in sectors that rely heavily on routine tasks. This can have significant social and economic impact, requiring additional employment policies to address retraining, reskilling, upskilling and support for affected workers. It is worth noting that the transition of unemployed workers during the Industrial Revolution to new job opportunities is unlikely to be repeated during the current introduction of AI in the workplace because of the higher entry standards and requirements associated with educational requirements, workplace skills and technological competencies. AI systems are vulnerable to cyberattacks, which can disrupt economic activities and compromise sensitive information. Ensuring robust cybersecurity measures is essential to mitigate these risks. The rapid development of AI technologies can outpace and outdate regulatory frameworks, making it difficult to establish appropriate guidelines, guardrails and standards. This can lead to regulatory gaps and inconsistencies. If AI-driven economic policies disproportionately benefit certain groups, it can exacerbate existing economic inequalities such as the digital divide within and between countries. Ensuring that AI benefits are distributed equitably is essential for inclusive economic growth.

The use of AI in economic governance raises ethical questions, such as the extent to which AI should be involved in decision-making processes and the potential for AI to be used for manipulative purposes. Over-reliance on AI can make economic systems vulnerable to technical failures or errors. In consequence, it is important to maintain a balance between AI-driven solutions and human oversight. Addressing these risks requires a combination of robust regulatory frameworks, ethical guidelines, appropriate guardrails, human oversight, critical thinking, transparency and accountability, and continuous monitoring and evaluation of AI systems.

AI is being used in economic governance across the globe to improve efficiency, transparency, and decision-making. Some real-world examples include: fraud detection in welfare programs, urban planning, traffic management, public safety, drafting municipal policies by analyzing examples and best practices from other municipalities, detecting tax evasion, streamlining tax collection processes, AI chatbots are deployed to assist citizens with accessing government services quickly and efficiently, creating systems in healthcare governance to ensure adherence to data privacy laws and improving patient outcomes, helping local governments draft financial narratives for budgeting and freeing up officials for strategic tasks. These examples showcase how AI is revolutionizing governance around the world by making it more responsive, efficient and effective.

Conclusion

The ascent of the new global economy of the 21st century and the cataclysmic superfecta of the first three decades of the new millennium have revealed the contemporary fissures and fault-lines in economic governance. The global economic landscape has changed in a profound and indelible manner. Transformational change is the signature mark of this dynamic metamorphosis. Internetization is leading the process of transformational change in the new century. All of this is evident in the groundbreaking advances in science and digital technology. Technological innovations are being introduced at record speed. AI represents a monumental scientific and technological innovation. It is clearly a game changer for the scope and substance of economic governance and has created new opportunities to enhance the efficacy of economic governance. In effect, humanity is on the cusp of enabling AI to transform the modern mission and mandate of economic governance.

This paper has proposed a redesign of economic governance and a responsible pathway for harnessing AI's vast potential and minimizing its perceived threats. The new template for the redesign of economic governance takes the form of the 6E's of modern economic governance. The 6E's of modern economic governance are efficient, equitable, effective, enduring, empathetic, and empowering. In addition, the paper proposes upscaling the economic governance architecture, the machinery of economic governance and economic policy for the purpose of realigning the modern mission and mandate of economic governance with the contemporary challenges and opportunities of the 21st century.

Governments must take a leadership role in developing policies for the responsible, safe, secure and ethical use of AI. By successfully integrating AI into economic governance, they can enhance the efficacy of economic governance and position AI for the purpose of contributing to a more prosperous economy. At the present time, advances in AI are far outpacing the parameters for containing the malfeasance and harm that AI can inflict. There is an urgent need to implement corrective public policy and create ethical guardrails to address this matter. In strategically deploying AI for the public good, governments must drive the evolution of AI to mitigate the collateral harm and compound its benefits. This will provide them with the moral authority to nurture its future development and operationalize its administrative capacity. All of this, for the purpose of positioning AI as a catalyst that will chart an inspired roadmap for the betterment of humanity.

Just as Thomas Malthus underestimated technological progress in agriculture, today's governance institutions must avoid the Malthusian trap and integrate AI in the modern mission and mandate of economic governance. All of this for the purpose of unlocking AI's full potential on the economic landscape. AI is capable of empowering economic governance and driving impactful change. By responsibly and purposefully integrating AI, economic governance institutions can place themselves at the forefront of innovation, enhancing economic policy and the efficacy of economic governance. A balanced approach will be required, that embraces AI while simultaneously addressing the challenges of digital malfeasance.

References

- Bengio, Y., Mindermann, S., Privitera, D., Besiroglu, T., Bommasani, R., Casper, S., & Varoquaux, G. (2024). **International Scientific Report on the Safety of Advanced AI (Interim Report)**. Retrieved from https://assets.publishing.service.gov.uk/media/6716673b96def6d27a4c9b24/international_scientific_report_on_the_safety_of_advanced_ai_interim_report.pdf.
- Dixit, Avinash. (2008). "Economic Governance", in Steven N. Durlauf and Lawrence E. Blume (eds), **The New Palgrave Dictionary of Economics**, 2nd edition, Basingstoke and New York: Palgrave Macmillan.
- European Union. (2024). **Regulation (EU) 2024/1689 of the European Parliament and of the Council of 12 July 2024 on harmonized rules for artificial intelligence (AI Act)**. Official Journal of the European Union, L 228, 1–72. Retrieved from <https://eur-lex.europa.eu/eli/reg/2024/1689/oj/eng>.
- Friedman, Milton. (1951). "Neoliberalism and its Prospects". **Farmand**, February 17, 1951, 89-93.
- Hayek, Friedrich. A. (1944). **The Road to Serfdom**. University of Chicago Press.
- Keynes, John M. (1936). **A General Theory of Employment, Interest and Money**, London: Palgrave Macmillan.
- Legislative Assembly of Ontario. (2024). **Bill 194, Strengthening Cyber Security and Building Trust in the Public Sector Act, 2024**. Statutes of Ontario, Chapter 24. Retrieved from Legislative Assembly of Ontario <https://www.ola.org/en/legislative-business/bills/parliament-43/session-1/bill-194>.

- Malthus, T. R. (1798). **An Essay on the Principle of Population**. J. Johnson.
- North, Douglass. C. (1990). **Institutions, Institutional Change, and Economic Performance**. Cambridge University Press.
- Passaris, Constantine. (2024A). "The Role of Internetization in Creating Sustainable Development for the Global South", **Real World Economics Review**, issue no. 109, pp. 36-55.
- Passaris, Constantine. (2024B). "Economic Governance and the Asymmetric Impact of COVID-19", eds. M. A. Madi, M.R. Dias & S. Fari, **The Political Economy of COVID-19**, Bristol, UK: WEA Books, pp. 175-206.
- Passaris, Constantine. (2021). "The Ascent of Internetization", **Academia Letters**, Article 2531. Retrieved from [https://www.academia.edu/50657549/The Ascent of Internetization](https://www.academia.edu/50657549/The_Ascent_of_Internetization).
- Smith, Adam. (1776), **An Inquiry into the Nature and Causes of the Wealth of Nations**, (1 ed.). London: W. Strahan.
- Williamson, O. E. (1985). **The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting**. Free Press.

Author contact: passaris@unb.ca

SUGGESTED CITATION:

Constantine E. Passaris, "The transformational role of artificial intelligence in the pursuit of good economic governance", *real-world economics review*, issue no. 112, December 2025, pp. 21- 35, <http://www.paecon.net/PAEReview/issue112/Passaris112.pdf>

You may post and read comments on this paper at <http://rwer.wordpress.com/comments-on-rwer-issue-112/>

Elements for a Radical Inflation Targeting

Carlos Guerrero de Lizardi

[School of Economics, Universidad Nacional Autónoma de México (UNAM)]

Copyright: Carlos Guerrero de Lizardi, 2025
You may post comments on this paper at
<http://rwer.wordpress.com/comments-on-rwer-issue-no-112/>

1. Introduction

The European Central Bank's primary objective is to maintain price stability, that is, "to preserve the purchasing power of the euro", and its quantitative target is a rate of inflation of two per cent over the medium term. Something almost identical is declared by Central Banks of the countries all around the world, with their target being a similar growth rate of the consumer price index (CPI) or, in the case of USA, of the personal consumption expenditures price index (PCE).

At the beginning of this century, the International Monetary Fund (Carson, Enoch and Dziobek 2002) published a book with a suggestive title, *Statistical Implications of Inflation Targeting: Getting the Right Numbers and Getting the Numbers Right*. Chapter 10, entitled *Price indices for inflation targeting* (Bloem, Armknecht and Zieschang 2002), discusses the need for a "second-generation approach" which proposes to replace the inflation target defined as the growth rate of the CPI with either the producer price index or the implicit GDP deflator.

The objectives of this document are as follows.

- Initially, to add arguments both from economic theory –which underpins the theory and practice of central banks– and from theory of index numbers, regarding the apparent convenience of adopting a second-generation approach as already suggested by Bloem, Armknecht and Zieschang (2002: 173).
- Moving away from orthodoxy and heterodoxy, highlighting the weaknesses of the notion of "price level" –and, as a consequence, of the theory and practice of Central Banks' inflation targeting. For the moment, suffice it to point out that in the corresponding entry of *The New Palgrave Dictionary of Economics* (2018: 10,698), it is concluded: "... a proper theory of the price level remains yet to be written."
- Making use of all of the above, propose a radical inflation targeting policy to improve the performance of Central Banks.

At the end of the document we present some critical notes emphasizing the ideological role of the current inflation targeting and its lack of theoretical sense.

2. The CPI from the perspective of measurement in economics

At least initially, data may be considered scientific objects if their accounting definition corresponds, weakly or strongly, to a theoretical definition –be it true or false–; because measuring instruments were used for their construction and to the extent that it is recognized they contain errors and biases

(Haavelmo 1944).¹ That said, Koopmans (1947) added an out-of-the-box case, synthesized in the title of his publication, *Measurement without theory*. The Nobel laureate exemplified his extreme case using the National Bureau of Economic Research's (NBER) business cycle dating. From any point of view, this case reflects a basic methodological flaw or, in other words, mere empiricism.

One hundred and fifty years ago Alfred Marshall (1886: 10-1) wrote the following:

“A perfectly exact measure of purchasing power is not only unattainable, but even unthinkable. The same change of prices affects the purchasing power of money to different persons in different ways. For to him who can seldom afford to have meat, a fall of one-fourth in the price of meat accompanied by a rise of one-fourth in that of bread means a fall in the purchasing power of money; his wages will not go so far as before. While to his richer neighbour, who spends twice as much on meat as on bread, the change acts the other way.”

The theoretical notion at stake is the unequal effect of price changes on the purchasing power of consumers with different incomes. From the point of view of neoclassical theory, the problem faced by any consumer –be she poor, very poor, rich or super rich, relatively speaking– is the substitution of goods and services as an attempt to remain on the same indifference curve, that is, to grasp the same level of utility at different prices. In the case of two or more consumers, the father of modern economics not only stated that an unbiased measurement of the change in their purchasing power is unattainable but unthinkable, that is, lacking theoretical sense. The background lies in the impossibility of comparing and aggregating the utility levels of two or more consumers (Persky 1998: 203). In the same vein, for Angus Deaton (1998: 44), Nobel Prize winner, the assumption of identical preferences among consumers, that is, the creation of the fictional character named representative consumer, constitutes a mere *artefact* in order to avoid the key question: “It is all very well to suggest that the CPI should move closer to a true cost-of-living index, but it would be wise to discuss whose cost of living we are talking about.”²

¹ For Boumans (2007: 4): “The reliability of measurement results can so be characterized by three features: ‘invariance’, ‘accuracy’ and ‘precision’. ‘Invariance’ refers to the stability of the relationship between measurand, measuring system and environment. ‘Accuracy’ is defined as the ‘closeness of the agreement between the result of a measurement and a true value of the measurand’ (VIM, 1993, p. 24), and ‘precision’ is defined as ‘closeness of agreement between quantity values obtained by replicate measurements of a quantity, under specified conditions’ (VIM, 2004, p. 23). The difference between invariance, accuracy and precision can be illustrated by an analogy of measurement with rifle shooting, where the bull’s eye represents the true value x . A group of shots is precise when the shots lie close together. A group of shots is accurate when it has its mean in the bull’s eye. When during the shooting the target remains stable this is a matter of invariance.”

² For Lavoie (2008: 9): “The word artefact carries several definitions. The most common definition, relevant to science, says that an artefact, or artifact, is a spurious finding caused by faulty procedures. It is a finding that does not really exist but that was created inadvertently by the researcher.” And Boumans (2005: 121) warns us (*italics* and **bold** ours): “In order to evaluate economic policy, models are built and used to produce numbers to inform us about economic phenomena. Although phenomena are investigated by using observed data, they themselves are in general not directly observable. To ‘see’ them we need instruments, and to obtain numerical facts about the phenomena in particular we need measuring instruments... Woodward characterises the contrast between data and phenomena in three ways. In the first place, the difference between data and phenomena can be indicated in terms of the notions of error applicable to each. In the case of data the notion of error involves observational mistakes, **while in the case of phenomena one worries whether one is detecting a real fact rather than an artifact produced by the peculiarities of one’s instruments or detection procedures**. A second contrast between data and phenomena is that phenomena are more ‘widespread’ and less idiosyncratic, less closely tied to the details of a particular instrument or detection procedure. A third way of thinking about the contrast between

Typically the CPI is a price index *à la Laspeyres*. In the case of the Mexican CPI, for example, it is divided into 299 categories called item strata or “generic” (INEGI 2018: 7):

$$P_L^t = \frac{\sum_{n=1}^{N299} q_n^0 p_n^t}{\sum_{n=1}^{N299} q_n^0 p_n^0} = \frac{q^0 * p^t}{q^0 * p^0} \quad (1)$$

Using the relative price definition, we rewrite (1) like this:

$$r_N^t = \frac{p_n^t}{p_n^0} \quad (2)$$

$$P_L^t = \frac{\sum_{n=1}^{299} q_n^0 p_n^0 r_n^t}{\sum_{n=1}^{299} q_n^0 p_n^0} = \sum_{n=1}^{299} \frac{q_n^0 p_n^0}{X^0} r_n^t = \sum_{n=1}^{299} s_n^0 r_n^t \quad (3)$$

Equation (3) shows why a CPI can be understood as a weighted sum of relative prices, with the weights (s_n^0) being the share in the base period of households’ spending, in plural, destined to the purchase of each good and service. Consequently, Prais (1959) called the aggregation method based on spending averages *plutocratic*, and, more recently, Mary Kokoski (2013) –a Bureau of Labor Statistics (BLS) researcher– summarized this characteristic as follows: “one dollar, one vote”.³

The fact that the CPI is an index number *à la Laspeyres* implies that the weights correspond to the base or reference period. Thus, the delay in updating it causes a variety of biases. For example, consumers stop buying expensive goods and services that are replaced by others that are relatively cheaper –and the same with respect to points of purchase. In this case, the gap between the true value and the estimated value of the price index causes the substitution bias.

While the BLS recognizes that the theoretical foundation of its CPI is orthodox consumer theory, the Mexican Statistical Institute (INEGI 2018: XV) asserts that the CPI is “merely” the monitoring of the prices of a basket of goods and services representative of households. By the way, the same narrative can be found on the Eurostat web portal. In contrast, Groshen et al. (2017: 188) –attached to the U.S. compilation agency– point out that the COLI approach serves “as the unifying framework and is the standard by which the BLS defines any bias.”

Theoretically speaking (National Research Council 2002), the BLS approach represents an economic perspective –which assumes a constant level of utility– called COLI (cost-of-living-index), and the INEGI approach an “empirical” one known as COGI (cost-of-goods-index). Noticeably, deliberately ignoring the microeconomic foundations –as many statistical institutes do– represent a modern case of measurement without theory. Its purpose is a futile attempt to refuse the existence of measurement errors and biases.

To document the “indifference” of the statistical makers, it is enough to quote the International Labor Organization of the United Nations, the agency responsible for the international manual at stake (ILO et al. 2004: chapter 11 point 11.66):

data and phenomena is that scientific investigation is typically carried on in a noisy environment, an environment in which the observations reflect the operation of many different causal factors.”

³ In a footnote, Prais (1959: 127) wrote the following: “The reader is advised to banish from his mind, if he can, the equations: democracy=good, plutocracy=bad.”

“Statistical agencies have been reluctant to provide their own estimates of CPI bias. In some cases, they have accepted the existence of substitution bias, recognizing that the use of a Laspeyres formula implies that the CPI usually will overstate price change relative to a cost-of-living index. Statistical agencies have, however, been reluctant to draw even qualitative conclusions from the fragmentary and speculative evidence on quality change, new products and new outlet bias.”

Oddly enough, the Mexican Statistical Institute (INEGI) pointed out –using information from more than ten years ago due to the disappearance of the survey that serves to establish the weights (the ENGASTO survey in Spanish) in the Mexican CPI– that its most recent “update” removed the substitution biases (2018: 8 and 23, *italics ours*):

“Representativeness in economic terms is achieved with a basket of goods and services that reflects the consumption patterns of an *average household* in the country; comparability over time requires that the measurement of the evolution of prices be carried out with respect to a base period of comparison. To guarantee the two qualities and generate a price index *without bias*, the content of the basket of goods and services was updated based on the consumption pattern of Mexican households that was obtained from the latest available expenditure surveys: ENGASTO 2012 and 2013, and ENIGH 2014... With the update of the expenditure weights, not only are international recommendations met, but it is also guaranteed to maintain the representativeness of the basket and *the bias due to the oldness of the weights and the bias due to the substitution effect are avoided.*”

As detailed by the ILO et al. (2004), biases are varied –due to the substitution of goods and services and points of purchase, quality changes, the introduction of new products, etc. The interesting thing here is that, leaving aside the negative bias due to deteriorations in the quality of goods and services, in the rest of the cases these are “upward” biases, which typically cause an overestimation of “inflation”. This has led central banks –out of self-interest– and non-public agencies to carry out research to estimate biases and call, with evidence in hand, for statistical institutes to improve their statistical work –among others, Moulton (2018), Feldstein (2017), and Sabourin (2012).

3. A phantasmagorical notion called the “price level”

We reviewed a good number of orthodox and heterodox articles and textbooks in order to find a theory or, at least, a definition of “price level”. Our search was fruitless –it constitutes, in other words, a phantasmagoria of vulgar economics.⁴ For example, only six times did Keynes (1939) write the words “price level” in his magnum opus. On page 3 of the preface to the French edition, we read the first mention:

“I have called this book the General Theory of Employment, Interest and Money; and the third feature to which I may call attention is the treatment of money and prices. The following analysis registers my final escape from the confusions of the Quantity

⁴ For Benjamin ([1982], 2002: 669): “The property appertaining to the commodity as its fetish character attaches as well to the commodity-producing society–not as it is in itself, to be sure, but more as it represents itself and thinks to understand itself whenever it abstracts from the fact that it produces precisely commodities. The image that it produces of itself in this way, and that is customarily labels as its culture, corresponds to the concept of phantasmagoria.” For Marx ([1872], 2011: 99, 372 and 657-8), vulgar economics is superficial and plagiaristic, ignorant, and mystifying and apologetic.

Theory, which once entangled me. I regard the price level as a whole as being determined in precisely the same way as individual prices; that is to say, under the influence of supply and demand. Technical conditions, the level of wages, the extent of unused capacity of plant and labour, and the state of markets and competition determine the supply conditions of individual products and of products as a whole. The decisions of entrepreneurs, which provide the incomes of individual producers and the decisions of those individuals as to the disposition of such incomes determine the demand conditions. And prices, both individual prices and the price level, emerge as the resultant of these two factors.”

Neither in the previous paragraph nor in the other five mentions of the “price level” do we find an explicit definition, let alone a theory. We chose Romer (2001) and Walsh (2003) as orthodox macroeconomics textbooks. In Romer (2001), from chapter 5 and extensively in chapter 10 –dedicated to monetary policy– the aggregate supply and demand model is discussed; the letter *P* relative to the “price level” is made explicit, but it is not defined either. In Walsh (2003) –the bedside book of central bankers– the “price level” is repeatedly brought up without making its theoretical content explicit.

A horrible example is the following. Milton Friedman –the former advisor to the dictator Pinochet (Klein, 2007), who received the Nobel Prize just three years after the coup d’état in Chile– wrote (1956: 3):

“The quantity theory of money is a term evocative of a general approach rather than a label for a well-defined theory. The exact content of the approach varies from a truism defining the term ‘velocity’ to an allegedly rigid and unchanging ratio between the quantity of money –defined in one way or another– and the price level –also defined in one way or another.”

We must point out, in the first place, that the Nobel laureate’s assertion that the quantity theory of money does not refer to a correctly defined theory but evokes a general perspective contradicts the title of the book itself (*Studies in the Quantity Theory of Money*). In short, the ambiguous tone does not fit into a theoretical discussion. Secondly, and all the worse, the quote talks about different definitions of the “price level”, but throughout the book we do not find a single one.

Last example. For Fisher ([1911], 1922: 18-9 and 15, *italics* ours):

“The purchasing power of money is indicated by the quantities of other goods which a given quantity of money will buy. The lower we find the prices of goods, the larger the quantities that can be bought by a given amount of money, and therefore the higher the purchasing power of money. The higher we find the prices of goods, the smaller the quantities that can be bought by a given amount of money, and therefore the lower the purchasing power of money. In short, the purchasing power of money is the reciprocal of the level of prices; so that the study of the purchasing power of money is identical with the study of price levels... We have found that the general level of prices is determined by the other magnitudes in the equation of exchange. But we have not hitherto defined exactly what a ‘general level’ may mean. There was no need for such a definition so long as we assumed, as we have usually done hitherto, that all prices move in perfect unison. But practically prices never do move in perfect unison. Their dispersion would render impossible the statistical study of general price movements were there no practical method of indicating the general movement. A simple figure indicating the general trend of thousands of prices is a great statistical convenience.

It also simplifies our equation of exchange by converting the right side, which now consists of thousands of terms, into a single simple term... *Such an indication is called an 'index number' of the price level. Its reciprocal indicates, of course, the purchasing power of money.*"

It seems that Fisher ([1911], 1922) hit the nail on the head but did not do so since he confused a theoretical definition (the price level) with the measuring instrument –an index number. By the way, Irving Fisher is also co-responsible for another imprecise expression, namely “purchasing power of money”.⁵ In the following sections we will delve into these two mistakes.

4. A complex social phenomenon

According to Deaton (2005: xvii), Sydney Afriat is the “guru” of the price index literature. The sincerity of the Nobel laureate’s words will guide the development of this section: “As a young mathematician, he arrived at Richard Stone’s Department of Applied Economics in Cambridge in the early 1950s, then the great center of research on theoretical and applied consumer behavior. He soon realized that neither he nor anyone else knew very much about what was meant by ‘the price index’, in spite of being part of the everyday discourse of economics. In the half century since then, he has been exploring the foundations of the topic.”

Afriat’s book published in 2005 is entitled *The Price Index and its Extension*. It has two explicit motivations. The following quotation shows how even Joan Robinson –a critical mind– looked down on our discussion:

“An early motive of the work had been to elaborate a concept of what really is a price index. Despite some notion of ‘price-level’ having a presence everywhere in economics, in both theory and practice, a deliberate concept had been hard to find... I submitted to Joan Robinson, giving a lecture that gave prominence to the price-level, ‘There are many prices and so many levels, so what could be the significance of a single level?’, and get an angry answer.”

The heart of the matter is the following. We are faced with a complex social phenomenon in the sense that, while the impact of price changes are, primarily, an “individual” issue, it is inappropriately resized as a macroeconomic one. Similar to the Marshall’s lines, Afriat exemplifies (2005: xxiv):

“It is imaginable that prices may rise for basic necessities and fall for luxuries so cost of living may rise for the poor and fall for the rich while the ‘price level’ remains unchanged. Thus in spite of the implication of a price index that the impact–understood as proportional adjustment of income to offset the effect on purchasing power of the

⁵ Early on, Marx ([1867], 1887: 82) advanced the critique of the quantitative equation of money: “The law, that the quantity of the circulating medium is determined by the sum of the prices of the commodities circulating, and the average velocity of currency may also be stated as follows: given the sum of the values of commodities, and the average rapidity of their metamorphoses, the quantity of precious metal current as money depends on the value of that precious metal. The erroneous opinion that it is, on the contrary, prices that are determined by the quantity of the circulating medium, and that the latter depends on the quantity of the precious metals in a country; this opinion was based by those who first held it, on the absurd hypothesis that commodities are without a price, and money without a value, when they first enter into circulation, and that, once in the circulation, an aliquot part of the medley of commodities is exchanged for an aliquot part of the heap of precious metals.”

price change—is the same everywhere, it is in principle, and in reality, different where income and equally anything else is different.”

As a result of price changes, there is a social need to have some kind of yardstick, to some extent accepted by all of us, in order to roughly assess what happened to our purchasing power. Afriat’s final messages are complex (2005: 29, xxiii and xxv):

“The ‘index’ language comes in economics from compulsion to give numbers even when the meaning is not and perhaps cannot be known... All the same, it is very hard to envisage an actual abandonment of that single number and much respected social institution, the price index, to represent an official view for the community of how prices have changed... It should be no longer plausible, even to convinced ‘price level’ believers, that the whole situation can be effectively summarized by a single number. It has been never plausible even though prodigious theories have depended on the idea...”.

I think that the notion of price level is still in our heads because, first of all, neoclassical economists know that they are in a dead end, so they simply do not address the issue at stake either theoretically or in terms of the implications for the making of economic policies, including monetary policy.

Secondly, because heterodox economists have not bothered to critically review either its micro-foundations or their “macroeconomic meaning”. The false impression about the existence of a price level –and consequently of “a rate of inflation”– is shared by both orthodox and heterodox economists. For example, in their *A New Guide to Post Keynesian Economics*, Holt and Pressman wrote (2001: 2-3):

“Much ink has been split about what Keynes meant in *The General Theory* and what his challenge to orthodoxy actually was. Although these questions remain a matter of debate, it is generally accepted that the *General Theory* began the serious study of macroeconomics (sic)... For Keynes, as well as for Post Keynesians, it is demand that drives the overall economy... It determines the levels of unemployment and inflation...”.

And last but not least, because we are all infected by the same neoclassical virus whose contagion occurred during our ECON 101, specifically when reviewing *ad nauseam* the “analytical” graph of a market –with price and quantity on its axes and its demand and supply curves– expanded without any theoretical or methodological consideration to characterize an economy as a whole. Using Afriat’s insight (2005: 41-2):

“The so-called ‘Index Number Problem’ is an area of perplexity which comes from the use of terms whose meaning is not altogether known. From the insecure position that prices should have a ‘level’, that level, whatever it should be, can be denoted P . Then P , thus called into existence, joins the furniture of economic discussion. It is available to become a part in some edifice, and even in many since there is no habit to distinguish whether each appearance of P is really the same P or something entirely different. A problem arises because there could be a pause to examine how P should be determined, granted it exists.”

5. Radical inflation targeting

Let us return to the theoretical foundations. Trying to define the price level “as a whole” (as Keynes did) constitutes a tautology (in fact, a “banal tautology”) similar to that referred to by the Nobel Arrow (1958: 78): “national income is that which is measured by national income statisticians.”

We are forced then to leave the theoretical universe and jump into the empirical one. In our review of the seminal literature, only Walsh and Taylor (within the Council of Economic Advisers) do not confuse the implicit GDP deflator with the CPI. Let’s go into detail. To show empirical evidence on money, prices, and production, the cited bedside book (Walsh 2003: 13-4) used the GDP deflator and not the CPI. And in his famous article on the rules of monetary policy, Taylor (1993: 210-1) associated the price level with the GDP price index: “The Council of Economic Advisers published a consensus estimate that a one-year temporary increase in oil prices of 50 percent could temporarily raise the overall price level (GDP deflator) by about 1 percent and with a longer lag, cause real output to fall by about the same amount.”

In the above quote, as Fisher ([1911], 1922) did, a phantasmagorical theoretical notion is identified –the price level–, with a measurement –“needless” to say empirical, specifically a Fisher-style price index. Here are our proposals to improve the work of Central Banks.

Step #1. Neither orthodox nor heterodox macroeconomists have proposed a minimum definition of the “price level”. Theoretically speaking, from orthodoxy itself, it is an unthinkable concept. Thus, the broadest price index available in the System of National Accounts, the implicit GDP deflator, is a measure without theory. A corollary is that an economy’s inflation rate is also a mere empiricism of non-Marxist economics. In short, Central Banks must put their theory of the “price level” on the public table, the measurement instruments at play to recreate it empirically, and point out its potential errors and measurement biases.

About all this, a former member of the General Council of the Banque de France wrote the following (Maris 2014: 14):

“Diabolical and sinister, economics is the ash with which our age covers its sad face. In a few decades, a century from now, before perhaps, it will seem implausible that a civilization could have attached so much importance to a discipline that is not only empty, but also utterly boring... A discipline that had only its own contradictions as a science and only its contradictions as a matter of rationality, economics would end up revealing itself as an incredible ideological quackery (*charlatanerie idéologique*) that was also the morality of an epoch.”

Step #2. There is no purchasing power of money, or as Marx explains ([1867], 1887: 67), money has no price:

“We have only to read the quotations of a price-list backwards, to find the magnitude of the value of money expressed in all sorts of commodities. But money itself has no price. In order to put it on an equal footing with all other commodities in this respect, we should be obliged to equate it to itself as its own equivalent.”

By the way, Afrait (2005: 59) endorses our point of view:

“The distinction made between exchange value and use-value for goods produces the idea that money, or—what is more specific and understandable—any income, has a purchasing power which is variable depending on prices. The distinction is recognized, but at the same time there is need to avoid the awkwardness of maintaining it fully. The need must be understood, because otherwise there can be bewilderment at consequences of it.”

What exists is the purchasing power of a person’s expenditure or the purchasing power of the expenditure of a subgroup of the population. During a hearing, Arrow (1958) proposed that the BLS compile ten consumer price indices corresponding to the ten deciles of the distribution at stake. Plutocratic aggregation implies that, in fact, the Mexican Central Bank (MXCB) currently uses one of the ten price indices proposed by Arrow (1958), namely, the one corresponding to decile 9 (Guerrero 2010).⁶ Our proposal would be for the MXCB to use the price index corresponding to the first decile using a democratic aggregation approach (Prais, 1959). Expressed in blunt words, its priority should be another, namely, to take care of the purchasing power of the poorest in the country, which would contribute to a more equitable distribution of income with the passage of time –and not, as it does now, to prioritize the richest.

6. Final remarks

Data are, no more and no less, a form of recreation of our objects of study and are not, in any sense, the result of controlled experiments carried out in a laboratory (Guerrero 2024). In the same direction, as producers and consumers of data, caution must be exercised because measuring instruments shape our subject matter (Guerrero 2021: 36) and are not neutral (Muellbauer 1976: 32). The case analyzed here is absolutely bizarre. In the absence of a theoretical definition regarding the “price level”, non-Marxist economics identifies a measurement, be it the CPI or any other price index, with the “price level” of the economy.

The central banks’ dictum that they protect the purchasing power of money has no theoretical sense, and their targeting of the CPI growth rate has an ideological function. No central bank has ever made explicit, nor will it ever do so, that the current CPI is a plutocratic measurement. *Das Kapital* and its institutions have ignored their own orthodox and award-winning economists, and will continue to do so. In this sense, our radical proposal will be implemented until genuine left-wing governments take power in our countries.

References

- Afriat, Sydney. N. 2005. *The Price Index and its Extension: A Chapter in Economic Measurement*. New York: Routledge.
- Arrow, Kenneth J. 1958. The measurement of price changes. In *The Relationship of Prices to Economic Stability and Growth*. Joint Economic Committee U.S. Congress, U.S. Government Printing Office, 77-87.
- Banco de México. 2024. *Programa Monetario 2024*. México.

⁶ According to Deaton (1998: 43), the household for which the American CPI weights are correct lies at the 75th percentile of the expenditure distribution. In the case of Spain, the applicable percentile is the 61st (Izquierdo, Ley, and Ruiz-Castillo 2003: 149).

- Benjamin, Walter. [1982], 2002. *The Arcades Project*. First Harvard University Press paperback edition.
- Bloem, Adriaan M., Paul A. Armknecht and Kimberly D. Zieschang. 2002. Price indices for inflation targeting. In *Statistical Implications of Inflation Targeting: Getting the Right Numbers and Getting the Numbers Right*. Carol S. Carson, Charles Enoch and Claudia Dziobek eds., 172-98.
- Boumans, Marcel. 2005. *How Economists Model the World into Numbers*. Routledge.
- Boumans, Marcel. 2007. Introduction. In *Measurement in Economics: A Handbook*. M. Boumans ed., 3-18. Elsevier, Academic Press.
- Carson, Carol S., Charles Enoch and Claudia Dziobek eds. 2002. *Statistical Implications of Inflation Targeting: Getting the Right Numbers and Getting the Numbers Right*. Washington DC: International Monetary Fund.
- Deaton, Angus. 1998. Getting prices right: What should be done? *Journal of Economic Perspectives* 12(1): 37-46.
- Deaton, Angus. 2005. Foreword. In *The Price Index and its Extension: A Chapter in Economic Measurement*. Afriat, Sydney. N., xvii. New York: Routledge.
- Feldstein, Martin S. 2017. Underestimating the real growth of GDP, personal income and productivity. *NBER Working Paper* No. 23306.
- Fisher, Irving. [1911], 1922. *The Purchasing Power of Money, its Determination and Relation to Credit, Interest, and Crises*, assisted by Harry G. Brown, new and revised edition, New York: Macmillan. [The Purchasing Power of Money | Online Library of Liberty](#).
- Friedman, Milton. 1956. The quantity theory of money—A restatement. In *Studies in the Quantity Theory of Money*. Milton Friedman ed., 3-21. The University of Chicago Press.
- Groshen, Erica L., Brian C. Moyer, Ana M. Aizcorbe, Ralph Bradley and David M. Friedman. 2017. How government statistics adjust for potential biases from quality change and new goods in an age of digital technologies: A view from the trenches. *Journal of Economic Perspectives* 31(2): 187-210.
- Guerrero, Carlos. 2010. Alternative consumer price indexes for Mexico. *Center for International Development Working Paper* No. 42, John F. Kennedy School of Government, Harvard University.
- Guerrero, Carlos. 2021. Price Indices Suitable for the Monetary Policy: A Measurement in Economics Perspective. *Real-World Economics Review* 21(98): 150-69.
- Guerrero, Carlos. 2024. Data: a critical perspective. *Real-World Economics Review* 24(108): 16-28.
- Haavelmo, Trygve. 1944. The probability approach in Econometrics. *Econometrica* 12(supplement): iii-vi + 1-115
- Holt, Richard P. F. and Steven Pressman. 2001). *A New Guide to Post Keynesian Economics*. Routledge.
- ILO/IMF/OECD/UNECE/Eurostat/The World Bank. 2004, *Consumer Price Index Manual: Theory and Practice*. Geneva.
- INEGI. 2018. *Índice Nacional de Precios al Consumidor. Documento Metodológico: Base Segunda Quincena de Julio de 2018*. México.
- International Monetary Fund. 2021. *Mexico: Report on the Observance of Standards and Codes—Data Module*. IMF Country Report No. 21/277.
- Izquierdo, Mario, Eduardo Ley, and Javier Ruiz-Castillo. 2003. The plutocratic gap in the CPI: evidence from Spain. *IMF Staff Papers* 50(1): 136-155.
- Keynes, John M. 1939. *The General Theory of Employment, Interest and Money*. Project Gutenberg.
- Klein, Naomi 2007. *The Shock Doctrine: The Rise of Disaster Capitalism*. New York: Metropolitan Books, Henry Holt and Company.
- Kokoski, Mary. 2013. *Alternative Consumer Price Index Aggregations: Plutocratic and Democratic Approaches*. U.S. Bureau of Labor Statistics.

- Koopmans, Tjalling C. 1947. Measurement without theory. *The Review of Economics and Statistics* 39(3): 161-172.
- Lavoie, Marc. 2008. Neoclassical empirical evidence on employment and production, laws as artefact. *Economía Informa* 351: 9-36.
- Lavoie, Marc. 2022. *Post-Keynesian Economics: New Foundations*. Second edition, Edward Elgar.
- Lequiller, François and Blades, Derek. 2014. *Understanding National Accounts*. Second edition revised and expanded. OECD Publishing.
- Maris, Bernard. 2014. *Houellebecq Économiste*, Flammarion.
- Marshall, Alfred. 1866. *Official Papers of Alfred Marshall*. Published by the Royal Economic Society and Macmillan in 1926. J. M. Keynes eds. Londres.
- Marx, Karl. [1867], 1887. *Capital. A Critique of Political Economy*, Volume I, Book One: The Process of Production of Capital, [*Capital Volume I](#).
- Marx, Karl. [1872], 2011. *El Capital*, tomo I, volúmenes 1, 2 y 3, Siglo XXI, vigesimonovena reimpression.
- Moulton, Brent R. 2018. *The Measurement of Output, Prices, and Productivity: What's Changed Since the Boskin Commission?* Washington DC: The Brookings Institution.
- Muellbauer, John. 1976. The political economy of price indices. *Birbeck Discussion Paper* No. 22, revision June 1976, March.
- National Research Council. 2002. *At What Price? Conceptualizing and Measuring Cost-of-Living and Prices Indexes*. Charles L. Schultze and Christopher Mackie eds. Washington DC: National Academy Press.
- Persky, Joseph. 1998. Price indexes and general exchange. *Journal of Economic Perspectives* 12(1): 197-205.
- Prais, Sigbert J. 1959. Whose cost of living? *The Review of Economic Studies* 26(2): 126-34.
- Romer, David. 2001. *Advanced Macroeconomics*. Second edition. McGraw-Hill/Irwin.
- Sabourin, Patrick. 2012. Measurement bias in the Canadian consumer price index: an update. *Bank of Canada Review* Summer: 1-11.
- Taylor, John B. 1993. Discretion versus policy rules in practice. *Carnegie-Rochester Conferences Series on Public Policy* 39 December: 195-220.
- The New Palgrave Dictionary of Economics*. 2018. London: Palgrave Macmillan.
- Walsh, Carl E. 2003. *Monetary Theory and Policy*. Second edition. Cambridge: MIT Press.

Author contact: cgdl@unam.mx

SUGGESTED CITATION:

Carlos Guerrero de Lizardi, "Elements for a Radical Inflation Targeting", *real-world economics review*, issue no. 112, December 2025, pp. 36-46, <http://www.paecon.net/PAEReview/issue112/Lizardi112.pdf>

You may post and read comments on this paper at <http://rwer.wordpress.com/comments-on-rwer-issue-112/>

Beyond *Homo Economicus*: An Interdisciplinary Critique of Rationality in Economic Decision-Making

Constantinos Alexiou
[Cranfield University, UK]

Copyright: Constantinos Alexiou, 2025
You may post comments on this paper at
<http://rwer.wordpress.com/comments-on-rwer-issue-no-112/>

Abstract

This study provides a critical evaluation of the limitations of the *Homo Economicus* model, which regards economic agents as perfectly rational, self-interested utility maximisers who operate with complete information. Being the cornerstone of classical economics, this model appears to fail in reflecting the cognitive, ethical, and social complexities of real-world decision-making. By drawing on behavioural economics, psychology, and philosophy, this paper explores how cognitive biases, ethical and social frameworks jointly shape economic behaviour. We offer a critique on the persistence of *Homo Economicus* in economic discourse and highlight how market narratives treat irrational behaviour as mere preferences, hence, masking the model's limitations. Integrating Kantian ethics and Nietzschean critiques of rationality, the paper's interdisciplinary approach purports to present a more holistic framework for understanding decision-making. We argue that economic policy, financial regulation, and corporate strategy must move beyond reduced from models and instead incorporate aspects of psychology, morality, and social context. This framework offers a more comprehensive angle from which to interpret phenomena like financial crises, ESG trends, and the evolving nature of market behaviour in complex global economic systems.

Keywords: Homo Economicus, behavioural economics, bounded rationality, cognitive biases, ethical decision-making, interdisciplinary economics.

1. Introduction

The traditional economic model has long relied on the concept of *Homo Economicus*, which assumes that individuals act with perfect rationality, possess unlimited cognitive abilities, and are guided solely by self-interest. Chang (2022) argues that before 1980s, economics was shaped by a variety of schools of thought—such as Classical, Marxist, Keynesian, and others—each offering different moral and political viewpoints. However, since the 1980s, the Neoclassical school has dominated, emphasizing mathematical models and assuming that individuals are purely self-interested (Chang 2022; Söderbaum 2009). As such, agents make decisions based on complete and accurate information, always seeking to maximize personal utility (Persky 1995). While this construct has served as a convenient analytical tool, it oversimplifies human behaviour and fails to account for important aspects of decision-making, such as ethical considerations, and social influences (Schreck et al. 2020).

Hathaway (2021) suggests that despite its conceptual bankruptcy, the notion of *Homo Economicus*, is propped up by the very market discourse. According to his analysis, the abstraction of *the market* into a placeless, all-encompassing realm of exchange allows it to be seen everywhere and, consequently, justifies the omnipresence of the rational, utility-maximizing individual. The idealized conditions of perfect competition - perfect information, identical products, frictionless exchanges - create a fantasyland where *Homo Economicus* thrives, unchallenged by context or complexity (Hodgson, 2019). Even the elevation of *the market* to a godlike, omniscient entity reinforces the belief in its participants as hyper-rational agents, rendering real-world deviations irrelevant (Blocher, 2007). Ironically, the very irrationalities and social dynamics are reabsorbed into the economic orthodoxy as evidence of subjective preferences rather than as symptoms of a broken model; thus, the *Homo Economicus* myth persists not despite its flaws, but because market discourse insists on seeing those flaws as features (Hathaway 2021).

The concept of *bounded rationality*, introduced by Simon (1984), suggest that individual agents cannot process all available information without constraints. Instead, they rely on heuristics and mental shortcuts, which introduces bias in their decisions (Kahneman & Tversky, 1979). Furthermore, as epistemology suggest the fact that individuals operate in an imperfect information setting their implied knowledge and beliefs are inherently incomplete and fallible (Feldman 2003).

Faced with an increasing complexity of global economic systems it is imperative that a re-evaluation of traditional economic assumptions takes place. Financial instability, speculative bubbles, and systemic crises have revealed the inadequacies of models based solely on rational utility maximization. Similarly, policy breakdowns in climate change mitigation, wealth inequality, and corporate governance all reflect the need for an alternative economic paradigm with ethical criteria at its core while also acknowledging cognitive constraints. The development of Environmental, Social, and Governance (ESG) investment trends also reflect the need for decision-makers to prioritize long-term sustainability and ethical responsibility over short-term financial gain.

Extant critiques of the *Homo Economicus* principles - particularly from behavioural economics and philosophy - have markedly challenged pure rationality and self-interest. In particular, Kahneman and Tversky (1979) demonstrated, that cognitive biases systematically distort decision-making, whilst Sen (1977) argued that ethical considerations cannot be ignored in economic behaviour. Many of these critiques however remain disciplinary in scope, focusing either on psychology's role in decision-making or ethical concerns in isolation. What remains underexplored is how these dimensions interact - that is, how cognitive biases, ethical frameworks, and social influences jointly shape economic behaviour in ways that standard models fail to reflect (Bowles, 1998).

Drawing on the theoretical foundations of Kant and Nietzsche, this study seeks to bridge this gap by integrating insights from behavioural economics, psychology, and philosophy. Kant's emphasis on moral duty and ethical reasoning challenges the reductionist view of humans as purely self-interested actors, while Nietzsche's critique of rationality and exploration of human drives offer a deeper understanding of the irrational and value-laden dimensions of economic behaviour.

In this context, an interdisciplinary approach is needed to capture the complexity of human economic behaviour. Those economic decisions that are not made in isolation are shaped by an ever-present interaction of psychological biases, ethical principles, and social contexts (Andreoni & Miller 2002). Psychology gives us the building blocks to understand how cognitive limitations shape choice, while philosophy gives us a lens through which we can examine the ethical consequences of economic choice. Sociology provides prescriptive results regarding how far institutions, cultural values, and

group behaviour shape market outcomes (Fehr & Schmidt, 1999) while behavioural research has established that institutional factors – including social norms, institutional structure, and market pressure – significantly influence individuals' decisions (Ariely, 2008).

In the context of financial markets, Efficient Market Hypothesis (EMH) (Fama, 1970) has been highly discounted by evidence from behavioural finance suggesting market participants to have irrational attitudes, i.e., herd and overconfidence behaviour, which produce anomalies like speculative bubbles and financial crises (Benartzi & Thaler, 1995). Unless we include these other perspectives, the simplification of economic models will to a significant extent discredit the effectiveness of current policies to cope with real complexities.

This paper aims primarily to provide a wider and more realistic framework of a wiser and better understanding of economic decision-making that will inform policy, financial regulation, and corporate strategy. In particular, this research critically assesses the limitations of the Homo Economicus model and further proposes a more holistic framework that engages what has been discovered from behavioural economics, psychology, and philosophy. It also tests the central hypotheses of mainstream economic theory by examining how cognitive heuristics, ethical concerns, and social institutions shape choice. The framework also gives a more realistic account that clarifies our knowledge of market irregularities, like speculative bubbles and financial crises, by uncovering the psychological and social forces that lead to irrational behaviour.

The rest of the paper is organized as follows: Section 2 elaborates on the pertinent literature in various aspects of human decision making and rationality, whilst section 3 provides a critique of *Homo Economicus* and the role of behavioural economics. Section 4 proposes a holistic model of economic decision-making and section 5 provides some concluding remarks.

2. Pertinent Literature

2.1. Rationality and the Nature of Human Decision-Making

For centuries, the question of human rationality has been at the forefront of philosophy and economic theory. Classical rationalist philosophers, such as René Descartes and Immanuel Kant, advocated the idea that humans are inherently rational beings with the capacity for logical reasoning and valid decision-making. Descartes' (1641) famous dictum, *Cogito, ergo sum* (“*I think, therefore I am*”), encapsulates the belief that reason is the defining characteristic of human nature. Similarly, Kant (1785) argued that reason guides moral and ethical decision-making, instructing the principles by which people act in pursuit of the greater good. This philosophical foundation heavily influenced early economic theory, in particular the Homo Economicus model, which assumes that individuals act as rational agents that seek to maximize their utility. Classical and neoclassical economic theories built upon this assumption, hypothesizing that market participants always make rational, self-interested choices given available information (Esposito and Mastromatteo 2024).

Adam Smith's (1776) concept of the “invisible hand” further entrenched the notion that rational self-interest leads to optimal economic results. However, as economic thought evolved, scholars began to recognize the limitations of this purely rational model. The emergence of behavioural economics, pioneered by Kahneman and Tversky (1979), challenged the assumption of human rationality. Their work demonstrated how cognitive biases, emotions, and heuristics would consistently lead people to make irrational or suboptimal decisions and prove people loss averse, i.e., that people dislike losses

more strongly than they like equivalent gains - all of which defies the presumption of utility maximization rationality.

This shift is also coincident with some of the prominent developments in existentialist and pragmatist philosophy that acknowledge the complexity of human decision-making over abstract logic. Kierkegaard (1843) believed human choice is determined by subjective experience, emotion, and social context, rather than calculation of reason alone whereas field experiments in behavioural finance (Benartzi & Thaler, 1995) demonstrate that the risk-taking behaviour of investors deviates systematically from rational models as they overreact to losses in the short term despite the long-term gains in financial markets. Human decision making has traditionally been studied from the perspective of rationality, particularly in economics, finance, and cognitive psychology.

Classical economic frameworks have assumed that individuals make fully rational decisions out of available information to seek utility maximization (Zafirovski, 2008). However, recent research shows that decision making is considerably influenced by cognitive limitations, motivational and affective processes, and psychological biases that compromise the traditional rationality approach. More precisely, Ganuthula (2024) in a paper that integrates research from cognitive neuroscience and psychology, demonstrates that what could appear as departures from rationality could be adaptive responses that consider affective and motivational states. He further argues that rational behaviour does not solely result from logical reasoning but is a product of a dynamic interplay between motivation, emotions, and cognitive processes.

This perspective broadens the understanding of human judgment and suggests that cognitive biases under some circumstances may serve beneficial roles by aligning perception and cognition with underlying emotional states and motivations. A fundamental shift in the understanding of decision-making was brought about by Herbert Simon's bounded rationality theory. Giarlotta and Petralia (2024) point out Simon's argument that people are bound by cognitive and informational constraints and make decisions that are 'satisficing' rather than optimizing. This theory has been foundational in numerous fields, such as economics and finance, insofar as it brings into context the constraints in human computational powers as well as availability of information in decision-making.

Following such observations, behavioural economics employs principles from psychology to explain why individuals make seemingly irrational choices. Faria (2024) explains how cognitive biases, heuristics, emotions, and social influences shape economic decision-making. The study points out that these influences affect consumer behaviour, financial decision-making, and public policy, leading to interventions that allow individuals to make better choices. By including psychology in economic theory, behavioural economics creates a more nuanced explanation of decision-making processes that stray from purely rational assumptions.

The distinction between traditional finance and behavioural finance also calls for the inclusion of psychological perspectives in decision-making. Traditional finance theories, i.e., Efficient Market Hypothesis (EMH) and the Capital Asset Pricing Model (CAPM), assume investor rationality and market efficiency (Fama 1970; Sharpe 1964). However, empirical findings demonstrate persistent departures from these rational assumptions. Sameer (2024) analysis, for instance, describes how emotions, cognitive biases, and social influences affect investor decision-making, leading to inefficiencies in the market.

Additionally, Shiller (2000) provides significant empirical evidence that asset bubbles - such as the Dot-Com Bubble and the 2008 Housing Crisis - are caused by herd behaviour, speculation, and

overconfidence, all of which are contradictions of the EMH (Fama, 1970). Furthermore, Akerlof & Shiller (2009) argue that emotions and narratives play a core part in economic cycles, which aligns with the view that markets are psychologically and socially driven rather than calculation driven.

New advances in modelling investor behaviour have also tried to more realistically simulate sub-rational decision-making processes. Liu et al. (2024) present a framework that incorporates several aspects of sub-rationality into financial market simulations. Their model, which is based on reinforcement learning, replicates investor behaviour in the presence of bounded rationality, prospect biases, myopia, optimism, and pessimism. The findings indicate that these psychological influences significantly affect market liquidity and price efficiency, demonstrating that investor behaviour deviates systematically from purely rational expectations.

While bounded-rational and prospect-biased behaviours contribute to liquidity, myopic and pessimistic expectations make market fluidity decline. Collectively, the convergence of cognitive psychology research, behavioural economics, and finance research underscores that decision-making is not a purely rational process. Instead, it is a dynamic process influenced by motivational states, cognitive limitations, and psychological biases. Insights into these factors can make predictive models of behaviour more accurate, inform more effective policy and investment decisions, and ultimately reduce the disparity between theory and real-world decision-making.

2.2. The Role of Free Will vs. Determinism in Economic Decision-Making

The *determinism vs. free will* debate has been an ever-present topic of discussion in philosophy for centuries, shaping our understanding of human agency, blame, and choice. Baruch Spinoza and Friedrich Nietzsche presented contrary perspectives on whether humans have true free will or whether their choices are the result of factors beyond their control. Spinoza (1985), who was a determinist, argued that human behaviour is the result of prior causes and does not permit true freedom. In his view, individuals behave because of natural law and conditioning of the mind and not from independent decision. Nietzsche (1968) did, nonetheless, challenge traditional notions of free will but underlined the principle of will to power and argued that human beings are driven by unconscious factors and social forces rather than merely rational decision.

In the economic theory of old, free will has always been assumed as an axiom. The paradigm of *Homo Economicus* that dominated economic theory for so long presumed that individuals are rational agents that make decisions freely to maximize utility. Adam Smith's *Wealth of Nations* (1776) and later neoclassical economists assumed that market agents could assess information, weigh costs and benefits, and make rational decisions without interference. This role is highly akin to a libertarian understanding of free will in the sense that economic agents are independent from determinist forces (Hodgson 1998).

However, recent research in economic and behavioural finance challenged this assumption by revealing the extent to which heuristics, emotions, and cognitive biases impact decision-making. Path-breaking research by Kahneman and Tversky (1979) in behavioural economics demonstrated that individuals tend to make illogical choices due to mental shortcuts, loss aversion, and social influence. This view is consistent with a more deterministic view of human behaviour, since it implies that most economic choices are not freely determined but rather are influenced by unconscious cognitive biases and environmental pressures. Thaler's (1980) research on nudging also supports this notion, demonstrating how policymakers and institutions can shape choices by making subtle changes to decision-making environments.

In finance and the investment banking industry, the determinism versus free will debate is becoming sharper with the growing application of artificial intelligence (AI), algorithmic trading, and automation (Lo 2017). While previous investing was extensively marked by individual human choices, contemporary financial markets are increasingly controlled by prediction models, machine learning algorithms, and high-speed trading platforms (Kirilenko & Lo 2013; Barberis 2018). Such technological advances bring with them the fundamental questions of how far, if at all, investors actually do have free will in financial markets. To the extent that decisions become increasingly - or even completely - determined by machines, in how far can we still presume human investors have agency? This mirrors Nietzsche's argument against free will, since now financial markets are determined by forces outside the control of any individual, supporting a more deterministic economic behaviour.

Whereas orthodox economic theories anticipate rational independent choice, technological innovation and the findings of behavioural economics suggest economic choices are more dynamic and nuanced phenomena. Understanding these dynamics is therefore crucial to policy makers and investors in a world where human agency becomes more deeply embedded in automation and conditioning of the human.

2.3 Ethics and Economic Behaviour

The meeting place of ethics and economic action has been the subject of economic and philosophical debate for a while now. While mainstream economic methods have been prone to emphasize self-interest as the principal motivation of human decision-making, philosophical accounts suggest a more complicated understanding - one that embraces moral in addition to economic rationality (Bowles, 1998).

Aristotle's (1999) *virtue ethics*, for example, argues that ethical behaviour is not simply a question of following rules but of cultivating virtues such as fairness, honesty, and responsibility. He thought that individuals and societies thrive when they act in ways that conduce to moral virtues, rather than merely pursuing wealth or self-interest. Similarly, Adam Smith's *Theory of Moral Sentiments* (1759) rejects the purely self-interested account of economic behaviour. Smith, widely associated with free-market economics, argued that human relationships are regulated by empathy, fairness, and a sense of justice. He held that economic agents are not isolated rational actors but social beings prone to ethical influences.

Despite Smith's early identification of moral sentiment in economic activity, classical and neoclassical economic thought largely centred on self-interest and market efficiency. In *The Wealth of Nations* (1776), Smith introduced the concept of the 'invisible hand,' which suggested that individuals pursuing their own economic self-interest could unintentionally serve the good of society. This interpretation became central to classical economic theory, solidifying the *Homo Economicus* approach - wherein individuals are assumed to act solely in their own financial interest. Yet as economic systems collapsed, scholars and policymakers began to appreciate the significance of ethics in market behavior (Arrow 1951). The evolution of welfare economics, corporate social responsibility (CSR), and equity in economic exchange demonstrated a shift towards the incorporation of ethical considerations into economic modelling (Carroll 1999; Kahneman, et al. 1986).

In the world of finance today, the evolution into Human Investors from *Homo Economicus* is most evident in the growing emphasis on socially responsible investing (SRI) and Environmental, Social, and Governance (ESG) investing (Statman 2019). Investors are now taking note of ethical

considerations alongside financial returns, a recognition of the broadening appreciation that markets need to serve not just economic efficiency but societal well-being. ESG investment incorporates issues of environmental sustainability, social justice, and corporate governance into financial decision-making, supporting the notion that ethical conduct and long-term economic prosperity are aligned (Friede et al. 2015). The trend is reminiscent of the virtue ethics and moral sentiments schools of philosophical thought, where it is argued that economic conduct is not solely driven by the maximization of individual gain but also by the promotion of ethical and responsible decision-making (Sandel 2012).

Nowadays, the intersection of ethics and economic behaviour is an even more important area of inquiry, particularly as technological advances and algorithmic decision-making reshape economic existence. Two seminal works - *Ethics and Economics: An Introduction to Moral Frameworks* by Jonathan B. Wight (2015) and *The Ethical Algorithm: The Science of Socially Aware Algorithm Design* by Michael Kearns and Aaron Roth (2020) - provide complementary insights into the ways in which ethical considerations influence economic behavior and decision-making, both in traditional settings and in the era of digitalization.

In particular, Wight (2015) offers a foundational analysis of the moral dimensions of economic activity, arguing that economic life is founded upon three complementary ethical systems: outcome-based (focused on welfare outcomes), duty- and rule-based (emphasizing moral obligations), and virtue-based (character- and moral excellence-focused). Wight criticizes traditional economic focus on utility maximization, advocating instead for ethical pluralism - the argument that no single ethical system is dominant and that each has its applicable uses.

Under the same ethical foundations, Kearns and Roth (2020) update the debate to the era of the digital economy, in which algorithms are increasingly intermediating economic and social choices. For as much progress as algorithms have brought efficiency and innovation, they have also created grave ethical concerns, such as bias in loan approvals, college admissions, and hiring, and the erosion of privacy through data abuse. Kearns and Roth highlight the constraints of traditional regulatory approach and propose an alternative solution: socially responsible algorithmic design. It integrates ethical values into the actual framework of algorithmic systems so that they support social values and protect individual rights. Together, these works illustrate the evolving relationship between ethics and economic behavior.

Wight's emphasis on ethical pluralism provides the theoretical groundwork for understanding moral decision-making in conventional economic contexts, and Kearns and Roth translate this into the virtual context, engaging with the ethical challenges of algorithmic systems. Both texts demand a more nuanced and ethically sensitive understanding of economic behaviour, whether in policymaking, market regulation, or technology innovation. By embedding ethical values in economic and algorithmic choice, we can develop systems that are not only efficient but also equitable and fair. While the literature provides sweeping critiques of rational choice theory, they have been scattered across disciplines. The following section integrates these findings, demonstrating how behavioural economics, ethics, and social theory collectively undermine the assumptions of the Homo Economicus model.

3. A Critique of Homo Economicus and the Role of Behavioural Economics

3.1. Methodological differences: Mainstream vs. Behavioural Economics

Mainstream economics is highly reliant on experimental methods and tangible evidence, applying the scientific method to subject rational models of behaviour to tests (Smith 1982). In contrast, behavioural economics draws on a broad range of methodologies like hypothetical illustrations, controlled experiments, and real-world observation to understand the cognitive and emotional underpinnings of economic decision-making (Camerer et al. 2004).

Early behavioural research, such as Kahneman and Tversky's experiments and Thaler's mental accounting work, demonstrated that human decision-making deviates from the rational optimization assumed by orthodox economics (Thaler, 1980). Researchers like Grether and Plott (1979) questioned whether optimization theory could adequately explain human behaviour, and therefore behavioural economists supported their empirical data with controlled experiments and field observations (Loewenstein & Angner, 2007; Loewenstein & Adler 1995).

However, scepticism still exists regarding the external validity of experimental findings. While some experiments found no difference between experimental and hypothetical responses (Camerer & Hogarth, 1999), other researchers did find significant differences and maintained that context plays a significant role in decision-making (Neill et al., 1994; Parco et al. 2002). In order to bridge such issues, behavioural economists have turned to process measures and randomized field experiments, such as MRI scans, to observe brain activity during decision-making. Such methods provide additional evidence on the psychological and neurological foundations of economic decision-making, bridging the gap between theoretical abstractions and real behaviour.

3.2. Risk Perception and Decision-Making

Based on the dividend irrelevance theory of Miller and Modigliani (1961), rational investors ought to be indifferent about capital gains versus dividends. Nevertheless, a body of research works (Harris et al., 2015; Han et al., 2021; Chang et al., 2022) show that most investors are not that way. Instead, they have deep dividend preferences, even at the expense of inferior results - a practice taken advantage of by portfolio managers employing "juicing" strategies to push dividend yields aggressively. The catering model (Baker & Wurgler, 2004) and empirical results by Hartzmark and Solomon (2019) also illustrate how investor sentiment shortfalls rational expectations, particularly on the part of less informed investors who perceive dividends and capital gains as being different in kind. After correcting for behavioural biases like loss aversion and probability weighting (Tversky & Kahneman, 1992; Barberis et al., 2016), juicing's explanatory power disappears, highlighting the incompleteness of the Homo Economicus model in capturing real investor behaviour.

One of the central concepts in economics is opportunity cost - the cost of the next best alternative forgone. Behavioural economics emphasizes that risk perception is irrational but susceptible to cognitive influences and emotion. Prospect Theory (Kahneman & Tversky, 1979) opposes the traditional Expected Utility Theory by showing that individuals evaluate risks in terms of subjective gains and losses and not objective probabilities. Loss aversion, say, leads to the preference of loss avoidance over gain acquisition even when the latter offers higher expected utility (Rottenstreich & Hsee, 2001). Perception of risk is both quantitative and qualitative.

Quantitative methods like the Sharpe Ratio and Value at Risk (VaR) provide numerical risk measures but often fail to pick up the psychological factors that inform decision-making. For example, during the 2008 financial crisis, excessive reliance on VaR models led to crude risk underestimation due to the investors and regulators' neglect of emotional biases like greed and fear (Rizzi, 2015; Szyszka, 2011).

Behavioural economics thus demands integration of psychological understanding with traditional measures of risk so as to be able to understand and predict economic behaviour.

3.3. Consumer behaviour and Risk

Consumer choice-making in risky circumstances is a rich and multidimensional process regulated by both rational and affective considerations. Samuelson (1948) argues that decision emerges after people recognize the infinite character of the world and must make a choice between them, a reflection of the fundamental economic problem of unlimited wants versus limited means. Consumers, however, are typically under fear and uncertainty when making decisions, particularly in high-risk environments like financial markets (May, 1950). Low self-esteem will usually exacerbate this anxiety, so that individuals will resort to risk-reducing strategies such as brand loyalty, word of mouth, and heuristics (Coopersmith, 1967; Woodruff, 1972).

Behavioural theories, such as the Prototype-Willingness Model (Gerrard et al., 2008), abdicate from the idea of pure rationality by incorporating inner variables (e.g., willingness, self-esteem) and external variables (e.g., accessibility, media exposure) into economic choice. As an illustration, media portrayal of alcohol and aggression will increase customers' willingness towards more dangerous habits, thereby projecting the impact of social and environmental factors on economic decision-making.

3.4. Perception and Risk Perception in Economic Contexts

Whereas instinctive body reactions are passive, perception is active interpretation and selective observation of one's environment (Hellriegel, et al. 1989). Behavioural economics emphasizes that perception is subjective in nature, based on personal experience, emotions, and perceptual biases (Kast & Rosenzweig, 1974). This subjectivity applies especially in the financial markets, where risk perception and reward assessment by investors depend on factors including familiarity, overconfidence, and framing effects (Baker & Nofsinger, 2002; Weber, 1991).

Risk perception theories, such as Protection Motivation Theory (PMT) and Risk Homeostasis Theory (RHT), also illustrate the way individuals assess and respond to uncertainty. PMT suggests that individuals take precautionary measures when they perceive a high degree of threat, while RHT contends that more safety measures can lead to more risk-taking because individuals modify their behaviour based on perceived security (Wilde, 1994). These theories highlight the interaction between rational analysis and psychological factors in economic decision-making.

3.5. Behavioural Finance and the 2008 Financial Crisis

Behavioural economics has launched a strong critique of rational choice theory, questioning its underlying assumptions regarding human behaviour and market processes. Traditional economic model defenders, though, contend that rationality is still a useful and predictive concept for economic behaviour. We recognize these views and address important counterarguments, but highlight the need to incorporate behavioural economics into economic analysis, especially in the context of actual events such as the 2008 financial crisis.

In particular, one of the key claims in favour of orthodox models is rationality as an approximation. Researchers such as Becker (1962) hold the view that bounded rationality and cognitive biases do not disqualify rational choice theory but suggest that rationality occurs with certain bounds. While agents can make errors, their collective behaviour tends to represent rational outcomes over time, especially in competitive markets. This view is augmented by Friedman's (1953) 'as-if' hypothesis, assuming that even if humans do not make rational optimization decisions consciously, markets behave as if this happens, resulting in efficient outcomes in the presence of individual irrationalities.

Similarly, the Efficient Market Hypothesis theorists (Fama, 1970) argue that markets self-correct over time, as rational arbitrageurs exploit mispricing and restore equilibrium to the markets. Empirical evidence in favour of this position points out that most behavioural anomalies vanish once one controls for transaction costs and arbitrage opportunities (Malkiel, 2003). Although these arguments highlight the robustness and relevance of classical models, they do not effectively address the intricacies of human behaviour uncovered by behavioural economics.

The 2008 economic crisis, for instance, is a stark reminder of the shortcomings of classical economic theory and the requirement for behavioural insight. Classical theory, such as the Efficient Market Hypothesis (EMH), assumes that markets are in efficient states and that investors act rationally (Fama, 1965). However, the crisis demonstrated that cognitive biases such as overconfidence, herd behaviour, and emotional decision-making were significant drivers of the collapse of big financial institutions (Rizzi, 2015; Szyszka, 2011). For example, the widespread use of Value at Risk (VaR) models led to gross risk underestimation since investors and regulators failed to account for the possibility of huge losses (Vasileiou 2022). Similarly, the housing bubble was also driven by the hope that housing bonds would not default, due to emotional biases (Marney & Fakhry 2024). These behaviour variables entered into regulatory bodies too, and they are a classic example of the systems level irrationally driven decision-making. The crisis demonstrates a requirement for a more comprehensive framework combining behavioural science with traditional economic theory.

Even if traditional economic models remain useful for the analysis of aggregate market efficiency and behaviour, the 2008 financial crisis demonstrates that they are insufficient alone. Behavioural economics provides a critical approach for examining the social and psychological influences behind economic decision-making, particularly in a situation of crisis. By integrating behavioural understanding with traditional models, we can develop a more robust and realistic model for economic behaviour analysis, policymaking, and preventing future financial catastrophes. Thus, despite its flaws and shortcomings, behavioural economics is a subject that cannot be ignored and has to be seriously considered in any comprehensive economic analysis.

As Wight (2015) argues, ethical pluralism—the recognition that no single ethical system dominates—gives richness to our understanding of economic decision-making. Similarly, Kearns and Roth (2020) refer to the need to develop algorithms consonant with societal values and protective of individual rights, showing the ethical aspects of economic and technological systems. These arguments challenge the presumptions of classical economics and demand a richer, ethically sophisticated model of economic behaviour.

Recognizing the limitations of conventional economic assumptions, this study proposes an integrated model that unites the results of behavioural economics, psychology, and philosophy. The following section outlines this inter-disciplinary approach, offering a more comprehensive model for explaining and predicting economic decision-making in a more sophisticated financial environment.

4. An Alternative Model of Economic Decision-Making

Despite all its failings, behavioural economics is a field that must be taken seriously, particularly given the broader philosophical and psychological insights that it brings to economic research. Critics lament that behavioural economics lacks a grand theoretical paradigm, presenting instead a shopping list of biases and heuristics but no coherent predictive system (Gul & Pesendorfer, 2008). In addition, it has been faulted for its excessive use of laboratory experiments, which may not be capable of reflecting everyday economic behavior, especially in repeated, high-stakes interactions where decision-making would be more likely to adhere to rational expectations (Levitt & List, 2007). Such criticisms, nevertheless, do not undermine the significance of the field but rather point to areas of refinement and synthesis.

Classical economic theory, rooted in the rational agent assumption, has long dominated the discussion of market action. But this standard approach too often overlooks the deeper philosophical and psychological influences that shape human choice. Drawing on the insights of Kant and Nietzsche, the proposed methodology seeks to transcend the limits of the standard model by injecting ethical imperatives, cognitive constraints, and social pressures into economic theory. This informed perspective acknowledges the complexity of human behaviour, which is not fully explained by rationality. To this extent, behavioural economics, despite its current limitations, provides a necessary counterbalance to mainstream models.

It challenges the naive assumptions of rational choice theory and paves the way for a more holistic approach to economic phenomena. While it is not yet a fully integrated framework, its emphasis on real psychological and social facts renders it an indispensable tool for comprehending and coping with the complexity of modern economic behaviour. Thus, even while the discipline still evolves, its findings remain essential to a more inclusive and human-centred economics.

4.1. Major Components of the Framework

One of the presumptions of this model is that economic choice is not an independent decision but is intimately interconnected with moral, cognitive, and social factors. In the Kantian tradition, economic decisions are not utility-maximizing alone but are often governed by moral duty and universal moral principles. Kant's deontological ethics, established in his *Groundwork of the Metaphysics of Morals* (1785), suggests that human beings are bound by categorical imperatives—moral laws that are beyond self-interest. In economic activity, this manifests in phenomena such as corporate social responsibility and ethical investing, wherein decision-making is aligned with broader moral imperatives rather than pure profit maximization (Ulrich, 2008).

Similarly, Amartya Sen (1987) argues that ethical analysis lies within economics, not beyond it, and is at the core of its careful practice, contrary to mainstream division between moral commitment and rational choice. That economic behaviour is conditioned by notions of fairness, reciprocity, and mutual well-being challenges the premise of purely self-interest-based market participants and illustrates the applicability of moral consideration to economic choice. From this perspective, stakeholder capitalism's development, investigated by Freeman (1984), represents an evolutionary milestone in enshrining Kantian ethics in corporate management through consideration of obligations to communities, workers, and the environment.

By contrast, Nietzschean thought undermining this moral order privileges the will to power, creativity, and the revaluation of values. In *On the Genealogy of Morals* (1887), Nietzsche undermines the presuppositions of fixed moral obligations and rather treats economic behaviour as an area where individuals and institutions exercise their power and renegotiate economic values. His critique of herd instinct and passive conformity informs us on the dangers of groupthink in financial markets, speculative bubbles, and irrational exuberance—phenomena felt in contemporary crises.

Boltanski and Chiapello's analysis (2005) validates this point, demonstrating how contemporary capitalism realizes Nietzschean critiques by entrepreneurial innovation and individualistic disruption. Nietzsche's perspective highlights how economic actors, rather than being constrained by pre-given moral dictates, will tend to forge new values through innovation, disruption, and defiance of economic orthodoxy. Norman (2015) also contextualizes Nietzsche's economic relevance, noting how his revaluation of values opens up room for new forms of economic agency outside of both utilitarianism and deontological duty.

Beyond ethics and power dynamics, cognitive limitations also complicate decision-making. Behavioural economics has demonstrated that individuals employ heuristics and biases as frequently as unadulterated rationality. The Kantian principle of bounded rationality - human cognition is restricted by the edges of reason (Simon, 1984) - echoes in current studies of loss aversion, overconfidence, and herd behaviour (Kahneman, 2012; Thaler & Sunstein, 2008).

These limits imply a model of economic choice that is founded not on the idealized rational actor, but on human psychology. At the same time, Nietzsche's emphasis on instinct and unconscious drives suggests that economic actors are often motivated by underlying psychological forces of which they are not consciously aware. His insights anticipate modern integrations of neuroscience and psychology into economic theory that allow for emotional and cognitive biases that affect economic choice- further illustrating the inadequacy of exclusively rational-based models.

Social structures also condition economic action, since choice is embedded in cultural and institutional structures. The Kantian emphasis on duty and universal law suggests that social norms matter in guiding economic decision-making, facilitating cooperation, and enabling trust. Granovetter's (1985) theory of embeddedness testifies to this, noting that economic activity is embedded in social networks rather than independent exchanges. North (1990) also argues that both formal and informal institutions ultimately shape economic outcomes by structuring incentives and expectations. Nietzsche's warning about herd morality, however, is a warning against unthinking absorption of economic norms, and it points to the ways in which visionary entrepreneurs and disruptors reshape financial worlds.

As Zuboff (2019) and Brynjolfsson and McAfee (2014) explore, this tension is especially evident in the innovation of artificial intelligence and algorithmic decision-making, which simultaneously embody radical innovation and present new philosophical challenges to human agency and moral responsibility in economic processes. Floridi (2013) even warns that in this era of machine-decision making, traditional ethical theory is no longer sufficient, demanding a rethinking of moral agency in digital economies.

Overall, by embracing Kantian deontology, Nietzschean critique, behavioural insights, and sociological analysis, this model sketches a four-dimensional picture of economic behaviour - one that accepts moral reasoning, power relations, cognitive limitations, and institutional embeddedness as intrinsic to the way economic choices are made.

4.2. Applications of the Framework

By synthesising ethical, cognitive, and social dimensions, this philosophical framework has implications for real-world economic issues. Market anomalies, such as speculative bubbles, are better understandable by an examination of both Kantian rational structures and Nietzschean irrational appetites. Kant's emphasis on moral reasoning, based upon categorical imperatives (Kant, 1997), presents an insight into the moral boundaries that ought to delimit financial behaviour.

Meanwhile, Nietzsche's theory of the will to power and his critique of herd morality (Nietzsche, 1989) indicate how groupthink and irrational exuberance can fuel destabilizing market trends—a notion captured in behavioural economics studies of market psychology (Kahneman, 2012; Akerlof & Shiller, 2009). The dynamic between moral responsibility and individual assertion explains why financial markets fluctuate between stability and turmoil, governed by both ethical constraints and disruptive forces.

Financial crises often originate in failing to account for ethical and psychological factors in decision-making (Thaler & Sunstein, 2008). A Kantian approach would favor regulatory frameworks guaranteeing moral integrity of markets (Ulrich, 2008), preventing speculative excesses and fostering economic justice (Sen, 1987). Nietzsche's critique, on the contrary, suggests that crises may be a result of systemic stagnation and complacency of institutions and that they require radical changes and creative destruction (Nietzsche, 1978; Schacht, 1994).

By adopting a more holistic approach, policymakers can balance ethical responsibility with the need for innovation, crafting interventions that navigate the tension between stability and progress. This aligns with Polanyi's (2002) argument that economic systems are embedded within moral and cultural frameworks and that crises often arise when markets become disembedded from these social structures. North (1990) similarly emphasizes the need for institutional change as part of long-term economic adaptation.

Policymaking has also been able to benefit greatly from this broader understanding of economic behaviour. Traditional economic policy assumes predictable responses to incentives, but human behaviour is far more complex. Kantian ethics supports that policymaking should be informed by moral imperatives that improve long-run sustainability and social welfare (Sandel, 2010). Nietzschean thought, by contrast, warns against paternalist policy that suppresses individual agency and creativity in favour of a more dynamic, existential stance toward economic actors (Nietzsche, 1989; Boltanski & Chiapello, 2005).

A synthesis of these positions allows policy to encourage responsible economic behaviour while fostering the dynamism required for growth and transformation (Brynjolfsson & McAfee, 2014). This philosophical model of economic decision-making transcends the naive assumptions of rational self-interest, including the subtleties of moral consideration, cognitive constraints, and social impacts.

By combining Kant's moral imperative and Nietzsche's existential strength, this framework provides a denser, more complicated approach to describing economic action. Its uses range from correcting market failures, pre-empting financial crises, and informing better policy-making - particularly in a world where automation and algorithmic rule-making are increasingly shaping the contours of life (Zuboff, 2019; Floridi, 2013), and where conventional forms of human agency are being reconstituted.

5. Concluding remarks

This study has problematised the limitations of the *Homo Economicus* model, illustrating that economic behaviour is not necessarily driven by rational self-interest but is strongly conditioned by cognitive biases, moral imperatives, and social structures. By synthesising evidence from behavioural economics, psychology, and philosophy - in particular the theoretical foundation laid by Kant and Nietzsche - this article outlines a more unified paradigm for understanding decision-making in the real world.

Kant's emphasis on moral duty and the role of ethical deliberation, along with Nietzsche's critique of rationality and his exploration of human desires, provides a philosophical grounding for going beyond the narrow horizon of utility maximization. The interdisciplinary approach not only challenges the assumptions of mainstream economics but also offers a more nuanced framework for studying economic behavior. The proposed framework addresses some of the most fundamental questions in contemporary economics.

The study initially highlights the implications of cognitive biases and ethical dimensions for policy failures, arguing that economic policies ought to accommodate human irrationality and moral reasoning rather than being founded on presumptions of perfect rationality. Second, it sheds light on financial instability by examining how herd behaviour, overconfidence, and loss aversion - grounded in psychological and philosophical understandings of human nature - intensify market crises, with a view to advising more effective regulatory strategies. Third, it is aligned with the growing emphasis on ESG (Environmental, Social, and Governance) and ethical investing that calls for the integration of moral and social values in economic models, a position to which Kant's ethical theory and Nietzsche's critique of instrumental reason would subscribe. While this study offers a solid theoretical foundation, it also acknowledges its limitations and hints at prospective areas of future research.

The proposed model, though conceptually consistent, must be empirically verified through controlled experiments, field experiments, and real-world data to ascertain its predictive validity and mundane relevance. The rapid evolution of artificial intelligence and algorithmic trading adds complexity to economic decision-making—raising questions about human agency, moral responsibility, and the interplay between technology and behaviour—while the research's focus on Western economic systems may limit its applicability across diverse cultural and institutional contexts worldwide. The expansion of this model to incorporate cross-cultural perspectives would increase both its relevance and theoretical nuance. By crossing economics, psychology, and philosophy, this multidisciplinary approach not only provides critiques of mainstream approaches but also provides a more realistic and actionable description of economic behaviour.

Finally, the framework challenges scholars and practitioners to move beyond the constraints of *Homo Economicus*, embracing a more sophisticated, integrated approach that has room for the complexities of human choice. In doing so, it paves the way for more effective policy, sounder financial systems, and more ethically rooted economic activity, contributing to scholarship and practical problem-solving alike.

References

- Akerlof, G. A., & Shiller, R. J. (2009). *Animal Spirits: How Human Psychology Drives the Economy, and Why It Matters for Global Capitalism*. Princeton University Press.
- Andreoni, J., & Miller, J. H. (2002). Giving According to GARP: An Experimental Test of the Consistency of Preferences for Altruism. *Econometrica*, 70(2), 737-753.
- Ariely, D. (2008). *Predictably Irrational: The Hidden Forces That Shape Our Decisions*, Harper Publishers.
- Aristotle (1999). *Nicomachean Ethics* (T. Irwin, Trans.). Hackett Publishing. (Original work written c. 350 BCE)
- Arrow, K. J. (1951). *Social Choice and Individual Values*. Yale University Press.
- Baker, H.K. & Nofsinger, J.R. (2002). Psychological Biases of Investors. *Financial Services Review*, 11(2), 97-116.
- Baker, M., & Wurgler, J. (2004). A catering theory of dividends. *The Journal of Finance*, 59(3), 1125-1165.
- Barberis, N. (2018). Psychology-based models of asset prices and trading volume. In *Handbook of Behavioural Economics: Foundations and Applications 1* (pp. 79-115), Elsevier.
- Barberis, N., Mukherjee, A., & Wang, B. (2016). Prospect theory and stock returns: An empirical test. *The review of Financial Studies*, 29(11), 3068-3107.
- Becker, G. S. (1962). Irrational Behavior and Economic Theory. *Journal of Political Economy*, 70(1), 1-13.
- Benartzi, S. & Thaler, R. (1995). Myopic Loss Aversion and the Equity Premium Puzzle. *The Quarterly Journal of Economics*, 110(1), 73-92.
- Blocher, J. (2007). Institutions in the Marketplace of Ideas. *Duke Law Journal* 57(4) 821-889.
- Boltanski, L., & Chiapello, È. (2005). *The New Spirit of Capitalism* (G. Elliott, Trans.). Verso. (Original work published 1999).
- Bowles, S. (1998). Endogenous Preferences: The Cultural Consequences of Markets and Other Economic Institutions. *Journal of Economic Literature*, 36(1), 75-111.
- Brynjolfsson, E., & McAfee, A. (2014). *The Second Machine Age: Work, Progress, and Prosperity in A Time Of Brilliant Technologies*. W. W. Norton & Company.
- Camerer, C. F. & Hogarth, R. M. (1999). The Effects of Financial Incentives in Experiments: A Review and Capital-Labour-Production Framework. *Journal of Risk and Uncertainty*, 19, 7-42.
- Camerer, C., Loewenstein, G., & Rabin, M. (2004). *Advances in Behavioural Economics*. Princeton University Press.
- Carroll, A. B. (1999). Corporate Social Responsibility: Evolution of a Definitional Construct. *Business & Society*, 38(3), 268-295.
- Chang, H.J. (2022) *Edible Economics*, Public Affairs, New York.
- Chang, X., Guo, S., & Huang, J. (2022). Kidnapped mutual funds: Irrational preference of naive investors and fund incentive distortion. *International Review of Financial Analysis*, 83, 102279.
- Coopersmith, S. (1967). *The Antecedents of Self-Esteem*. San Francisco: W. H. Freeman and Company.
- Descartes, R. (1641). *Meditations on First Philosophy*. Paris: Michel de Soly.
- Eposito, L., & Mastromatteo, G. (2024). Behavioural Economics and the Nature of the Neoclassical Paradigm. *Mind & Society*, 23, 45–78. <https://doi.org/10.1007/s11299-024-00303-y>
- Fama, E. F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *Journal of Finance*, 25(2), 383-417.

- Faria, L. (2024). Behavioural Economics and Decision-Making: The Impact of Psychological Insights on Economic Choices. *Journal of Economics and Economic Education Research*, 25(S5), 1-3.
- Feldman, R. (2003). *Epistemology*. Prentice Hall.
- Fehr, E., & Schmidt, K. M. (1999). A theory of fairness, competition, and cooperation. *Quarterly Journal of Economics*, 114(3), 817–868. <https://doi.org/10.1162/003355399556151>
- Floridi, L. (2013). *The Ethics of Information*. Oxford University Press.
- Freeman, R. E. (1984). *Strategic Management: A Stakeholder Approach*. Pitman.
- Friede, G., Busch, T., & Bassen, A. (2015). ESG and Financial Performance: Aggregated Evidence from More Than 2000 Empirical Studies. *Journal of Sustainable Finance & Investment*, 5(4), 210-233.
- Friedman, M. (1953). The Methodology of Positive Economics. In *Essays in Positive Economics* (pp. 3-43). University of Chicago Press.
- Ganuthula, V. R. R. (2024). Beyond Cognitive Rationality: Integrating Motivation and Affect in Human Decision-Making. *Decision*, 51, 531-544. <https://doi.org/10.1007/s40622-024-00410-2>
- Gerrard, M., Gibbons, F., Houlihan, A., Stock, M., & Pomery, E. (2008). A Dual-Process Approach to Health Risk Decision Making: The Prototype Willingness Model. *Developmental Review*, 28(1), 29-61.
- Giarlotta, A., & Petralia, A. (2024). Simon's Bounded Rationality. *Decisions in Economics and Finance*, 47, 327–346. <https://doi.org/10.1007/s10203-024-00436-2>
- Granovetter, M. (1985). Economic Action and Social Structure: The Problem of Embeddedness. *American Journal of Sociology*, 91(3), 481– 510. <https://doi.org/10.1086/228311>
- Grether, D., & Plott, C. (1979). Economic Theory of Choice and the Preference Reversal Phenomenon. *American Economic Review*, 69(4), 623-638.
- Gul, F. & Pesendorfer, W. (2008) *The Case for Mindless Economics*, in Andrew Caplin, and Andrew Schotter (eds), *The Foundations of Positive and Normative Economics: A Hand Book*, Oxford Academic. <https://doi.org/10.1093/acprof:oso/9780195328318.003.0001>
- Han, D., Han, L., Wu, Y., & Liu, P. (2021). Dividend or growth funds: What drives individual investors' choices?. *International Review of Financial Analysis*, 77, 101863.
- Harris, L. E., Hartzmark, S. M., & Solomon, D. H. (2015). Juicing the dividend yield: Mutual funds and the demand for dividends. *Journal of Financial Economics*, 116(3), 433-451.
- Hartzmark, S. M., & Solomon, D. H. (2019). The dividend disconnect. *The Journal of Finance*, 74(5), 2153-2199.
- Hathaway, T. (2021) Fuck the Market. *Real-world Economics Review*, 97 (22), 62-77. <http://www.paecon.net/PAERReview/issue97/Hathaway97.pdf>
- Hellriegel, D., Slocum, J. W., & Woodman, R. W. (1989). *Organizational Behaviour*. St. Paul: West Pub. Co.
- Hodgson, G. M. (1998). The approach of institutional economics. *Journal of Economic Literature*, 36(1), 166–192.
- Hodgson, G. M. (2019). How Mythical Markets Mislead Analysis: An Institutional Critique of Market Universalism. *Socio-Economic Review*, 18(4), 1153–1174.
- Kahneman, D. (2012). *Thinking, fast and slow*. Farrar, Straus and Giroux.
- Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, 47(2), 263-291.
- Kahneman, D., Knetsch, J. L., & Thaler, R. (1986). Fairness as a Constraint on Profit Seeking: Entitlements in the Market. *American Economic Review*, 76(4), 728-741.
- Kant, I. (1785). *Groundwork of the Metaphysics of Morals* (M. Gregor, Trans.). Cambridge: Cambridge University Press.

- Kast, F. E., & Rosenzweig, J. E. (1974). *Organization and Management: A Systems Approach (2nd ed.)*. New York: McGraw-Hill.
- Kearns, M., & Roth, A. (2020). *The Ethical Algorithm: The Science of Socially Aware Algorithm Design*.
- Kierkegaard, S. (1843). *Either/Or: A Fragment of Life* (H. V. Hong & E. H. Hong, Trans.) Princeton, NJ: Princeton University Press.
- Kirilenko, A. A., & Lo, A. W. (2013). Moore's Law versus Murphy's Law: Algorithmic Trading and Its Discontents. *Journal of Economic Perspectives*, 27(2), 51-72.
- Liu, P., Dwarakanath, K., Vyetenko, S. S., & Balch, T. (2024). Limited or Biased: Modeling Sub-Rational Human Investors in Financial Markets. *arXiv preprint* https://arxiv.org/abs/2210.08569?utm_source=chatgpt.com
- Levitt, S. D., & List, J. A. (2007). What Do Laboratory Experiments Measuring Social Preferences Reveal About the Real World? *Journal of Economic Perspectives*, 21(2), 153-174.
- Lo, A. W. (2017). *Adaptive Markets: Financial Evolution at the Speed of Thought*. Princeton University Press.
- Loewenstein, G., & Adler, D. (1995). A Bias in the Prediction of Tastes. *Economic Journal*, 105(431), 929-937.
- Loewenstein, G. F., & Angner, E. (2007). Behavioural Economics. In *Handbook of the Philosophy of Science: Philosophy of Economics*, 641-690.
- May, R. (1950). *The Meaning of Anxiety*. New York: The Ronald Press Co.
- Malkiel, B. G. (2003). The Efficient Market Hypothesis and Its Critics. *Journal of Economic Perspectives*, 17(1), 59-82.
- Marney, J.P. & Fakhry, B. (2024). A review of the behavioural factors influencing the housing market, *Journal of Economic and Social Thought*, 11(1- 2), pp. 1– 34. Available at: <https://journals.econsciences.com/index.php/JEST/article/view/2479>
- Miller, M. H., & Modigliani, F. (1961) Dividend policy, growth, and the valuation of shares. *The Journal of Business*, 34(4), 411-433.
- Norman, J. (2015). Marx, Nietzsche, and the Workshops of History. *Journal of Nietzsche Studies*, 46(3), 391–407. <https://doi.org/10.5325/jnietstud.46.3.0391>
- Zafirovski, M. (2008). Classical and Neoclassical Conceptions of Rationality - Findings of an Exploratory Survey. *The Journal of Socio- Economics*, 37(2), 789- 820. <https://doi.org/10.1016/j.socec.2006.12.053>.
- Mullainathan, S., & Thaler, R. (2000). Behavioral Economics. *NBER Working Paper No. w7948*.
- Neil, H., Cummings, R., Ganderton, P., Harrison, G., & McGuckin, T. (1994). Hypothetical Surveys and Real Economic Commitments. *Land Economics*, 70(2), 145-154.
- Nietzsche, F. (1968). *The Will to Power*. Vintage Books.
- Nietzsche, F. (1978). *Thus Spoke Zarathustra* (W. Kaufmann, Trans.). Penguin Books. (Original work published 1883–1885).
- Nietzsche, F. (1989). *On the Genealogy of Morals* (W. Kaufmann & R. J. Hollingdale, Trans.). Vintage Books. (Original work published 1887).
- North, D. C. (1990). *Institutions, institutional change and economic performance*. Cambridge University Press.
- Parco, J., Rapoport, A., & Stein, W. (2002). Effects of Financial Incentives on the Breakdown of Mutual Trust. *Psychological Science*, 13, 292-297.
- Persky, J. (1995). Retrospectives: The Ethology of Homo Economicus. *The Journal of Economic Perspectives*, 9(2), 221–231.
- Polanyi, K. (2002). *The Great Transformation: The Political and Economic Origins of our Time*. Beacon Press. (Original work published 1944).

- Rizzi, J. V. (2015). Behavioural Bias of the Financial Crisis. *Journal of Applied Finance*, 18(2).
- Rottenstreich, Y., & Hsee, C. K. (2001). Money, Kisses, and Electric Shocks: On the Affective Psychology of Risk. *Psychological Science*, 12(3), 185–190.
- Schacht, R. (1994). *Nietzsche, Genealogy, Morality: Essays on Nietzsche's Genealogy of Morals*. University of California Press.
- Sameer, S. (2024). *Traditional Finance and Behavioural Finance: Understanding the Rationality Paradigm in Financial Decision-Making*.
- Samuelson, P. A. (1948). *Economics*. New York: McGraw-Hill.
- Sandel, M. J. (2012). *What Money Can't Buy: The Moral Limits of Markets*. Farrar, Straus and Giroux.
- Sandel, M. J. (2010). *Justice: What's the Right thing to Do?* Farrar, Straus and Giroux.
- Schreck, P., van Aaken, D., & Homann, K. (2020). There's Life in the Old Dog Yet. *Journal of Business Economics*, 90, 401–425.
- Sen, A. (1977). Rational Fools: A Critique of the Behavioural Foundations of Economic Theory. *Philosophy & Public Affairs*, 6(4), 317-344.
- Sen, A. (1987). *On Ethics and Economics*. Basil Blackwell.
- Shiller, R. J. (2000). *Irrational Exuberance*. Princeton University Press.
- Simon, H. A. (1984). *Models of Bounded Rationality* (Vol. 1). MIT Press.
- Smith, A. (1759). *The Theory of Moral Sentiments*. London: A. Millar.
- Smith, A. (1776). *An Inquiry into the Nature and Causes of the Wealth of Nations*. London: W. Strahan and T. Cadell.
- Söderbaum, P. (2009) A Financial Crisis on Top of the Ecological Crisis: Ending the Monopoly of Neoclassical Economics, *Real-World Economics Review*, 100(49),30-40.
- Thaler, R. (1980). Toward a Positive Theory of Consumer Choice. *Journal of Economic Behaviour & Organization*, 1(1), 39-60.
- Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving Decisions About Health, Wealth, and Happiness*. Yale University Press.
- Tversky, A., and D. Kahneman (1992). Advances in Prospect Theory: Cumulative Representation of Uncertainty. *Journal of Risk and Uncertainty*, 5(4), 297–323.
- Ulrich, P. (2008). *Integrative Economic Ethics: Foundations of a Civilized Market Economy*. Cambridge University Press.
- Vasileiou E. (2022). Inaccurate Value at Risk Estimations: Bad Modelling or Inappropriate Data? *Computational Economics*. 59(3):1155-1171. doi: 10.1007/s10614-021-10123-8. Epub 2021 Jun 23. PMID: 34177119; PMCID: PMC8219786.
- Weber, A. (1991). *Introduction to Psychology*. New York: HarperCollins.
- Wight, J. B. (2015). *Ethics and Economics: An Introduction to Moral Frameworks*.
- Wilde, G.J.S. (1994). *Target risk: Dealing with the danger of death, disease and damage in everyday decisions*. Toronto, Canada: PDE Publications.
- Woodruff, R. B. (1972). Brand Information Sources, Opinion Change, and Uncertainty. *Journal of Marketing Research*, 9(4), 414–418.
- Zuboff, S. (2019). *The Age of Surveillance Capitalism: The Fight for a Human Future at The New Frontier of Power*. PublicAffairs.

Author contact: constantinos.alexiou@cranfield.ac.uk

SUGGESTED CITATION:

Constantinos Alexiou, "Beyond *Homo Economicus*: An Interdisciplinary Critique of Rationality in Economic Decision-Making", *real-world economics review*, issue no. 112, December 2025, pp. 47- 65, <http://www.paecon.net/PAEReview/issue112/Alexiou112.pdf>

You may post and read comments on this paper at <http://rwer.wordpress.com/comments-on-rwer-issue-112/>

The Solow Residual or What Happens When Moral Philosophers Try Their Hand at Natural Philosophy

Bernard C. Beaudreau

[Université Laval, Québec, Canada]

Copyright: Bernard C. Beaudreau, 2025

You may post comments on this paper at

<http://rwer.wordpress.com/comments-on-rwer-issue-no-112/>

Abstract

Material processes are well understood in all of the fields of natural philosophy, that is, in all applied physics-based fields (e.g. biology, Astronomy). However, this is not the case in economics where they remain an enigma, the Solow residual perhaps the best testimony. This paper argues that this unfortunate and unacceptable state of affairs owes in large measure to the fact that moral philosophers, from Smith to Romer, were and are ill-equipped to understand the laws that govern modern production processes, forcing them to develop alternative principles and laws, principles and laws which contravene those of natural philosophy and principles and laws which are the principal cause of what Moses Abramovitz referred to as our measure of ignorance, namely the Solow residual.

Introduction

From the enlightenment to the 19th century, the realm of knowledge consisted of moral philosophy which dealt fundamentally with the behavior of human beings, and natural philosophy which dealt with the behavior of material/physical processes/systems. David Hume and Adam Smith are examples of the former, while Newton, Leibniz and Fourier are examples of the latter. Physical systems consist of material processes which are energy based.¹ The transformation of raw materials is one such process, involving energy whether it be muscle based, or inanimate in nature (coal, oil, hydro, nuclear, etc.).

The industrial revolution witnessed the introduction of a new energy source, one that would increase the operating speed/velocity of existing material processes and thus increase productivity manifold, namely the steam engine (atmospheric, reciprocating and turbines). For example, artisan-operated looms were replaced by steam-powered ones, operating at greater speeds, and for longer periods (24/7). At work were the laws of physics, notably the law of kinetics according to which the velocity or speed of material processes was increasing in the square root of energy consumption. Put differently, energy consumption increased at the square of process velocity or speed. Ultimately, the result was levels of material wealth never before seen or experienced.

According to natural philosophy, specifically classical mechanics, thermodynamics and kinetics, neither capital (simple and complex tools) nor workers, not being sources of force/energy, are physically productive. In fact, workers were relieved of their age-old role of powering material processes with the widespread introduction of the Boulton-Watt reciprocating steam engine. As Alfred Marshall would point out in 1890, the workers of the pre-industrial period (i.e. those whose brawn

¹ Most of modern calculus (differential and integral) owes to the study of force/energy, as does classical mechanics. In short, natural philosophy is, in essence, the study of force/energy.

powered material processes) had metamorphosed into machine operatives. This is illustrated poignantly in contemporary process engineering textbooks where capital or tools define material processes and labor is, for all intents and purposes absent.

What Happens When Moral Philosophers Try Their Hand at Natural Philosophy?

Unfortunately for us all, natural philosophers were, for the most part, uninterested in the wealth of nations and more specifically, in the introduction of the steam engine in 1769. For at least two reasons. First, their interest was focused on celestial interests (planetary motion) and on motion (Isaac Newton) and second, steam as a force was poorly understood (thermodynamic laws were still a century away). As a result, the task fell on moral philosophers, the first of whom was Adam Smith who in 1776 penned “An Inquiry into the Nature and Causes of the Wealth of Nations” which is the first attempt by either a natural or moral philosopher to understand the laws of motion of industrial material processes.

As it turned out, the study of wealth-related material processes would over the next two centuries, with a few exceptions, be the exclusive domain of moral philosophers. Which is ironic as the subject matter was unequivocally one of natural philosophy. This paper chronicles the study of material processes by moral philosophers from Adam Smith to Paul Romer. It focuses on the evolution of what is referred to in the literature as production theory and its dynamic equivalent, growth theory highlighting the various constructs that were introduced over time. It will be shown that owing to their limited knowledge of the laws and concepts of natural philosophy, they would go on to elaborate a new set of laws, ranging from the law of diminishing marginal product of labor and capital to the Solow residual.

It is argued that if like in all other material sciences, the laws of natural philosophy were invoked and respected, most of what is known today as production theory would unfortunately be invalidated. The paper is organized as follows. To begin with, the paper chronicles the writings of moral philosophers from the early 19th century to the present. This is then followed by a scientific rejoinder, consisting of a physics-based approach to production. Lastly, it presents the various discordant voices regarding classical and neoclassical production theory over the past two centuries.

Material Processes as Seen by Moral Philosophers

This section examines material processes as seen by prominent 19th and 20th century moral philosophers. Table 1 begins with a listing of the 19th century stalwarts along with a description of their training/education. What is immediately obvious is the extent to which not one had any training in natural philosophy, with moral philosophy being the dominant major/area of specialization. It bears reminding that moral philosophy consisted, in large measure, of the fields of rhetoric, logic, philosophy, morals, ancient and modern languages and history. While Thomas Malthus was the only ecclesiastic -that is, member of an official church - all were trained as such – that is, as ministers/priests.

Table 1: 19th Century Moral Philosophers/Political Economists: University and Major

<i>Moral Philosopher/Political Economist</i>	<i>University</i>	<i>Degree</i>
Adam Smith 1723-1790	University of Glasgow	Classical and Contemporary Philosophy
David Hume 1766-1834	University of Edinburgh	Moral Philosophy
Thomas Malthus 1766-1834	Jesus College, Cambridge	English, Latin and Greek

Karl Marx 1818-1883	Bonn University	Law and Philosophy
John Stuart Mill 1806-1873	Schooled by James Mill, father.	Classics
William Stanley Jevons 1835-1882	University College School	B.A. and M.A. in Moral Sciences
Alfred Marshall 1842-1924	St-John's College, Cambridge	Mathematics, Philosophy, Metaphysics, Theology and Ethics
Francis Edgeworth 1845-1926	Trinity College, Dublin	Classics, Ancient and Modern Languages
John Bates Clark 1847-1938	University of Zurich, University of Heidelberg	German Historical School

Table 2: 20th-Moral Philosophers/Economists

<i>Moral Philosopher/Economist</i>	<i>University</i>	<i>Degree</i>
Paul Samuelson 1915-2009	Chicago and Harvard	B.A., M.A., and PhD Economics
Milton Friedman 1912-2006	Rutgers, Chicago	B.A., PhD Economics
Franco Modigliani 1912-2003	New School of Social Research	B.A., PhD Economics
Robert Solow 1924-2023	Harvard	B.A., PhD Economics
Robert Clower 1926-2011	Oxford	B.A., PhD Economics
Robert Lucas 1937-2025	Chicago	B.A. History, PhD Economics
Edward Prescott 1940-2023	Carnegie-Mellon	B.A. Operations Research, PhD Economics
Robert Gordon 1940-	Harvard, MIT	B.A., PhD Economics
William Baumol 1922-2017	London School of Economics	B.A., PhD Economics
Paul Romer 1955-	Chicago	B.A., PhD Economics

Table 2 presents the same listing of prominent 20th-century economists. Again, what stands out is the dearth of training outside the field of political economy, which as argued was an offshoot of moral philosophy. Another way of seeing 20th century economists is as second-generation moral philosophers, the main distinguishing feature was the extensive and intensive use of optimization techniques borrowed from thermodynamics (e.g. Lagrangians, Hamiltonians, Euler and Bellman Equations). The core of their training was (and remains to this day) firmly rooted in the work of 19th century moral philosophers/political economists (i.e. those listed in Table 1).²

Early 19th-Century Moral Philosophers

Considered to be the first political economists, the research methodology of early 19th century moral philosophers consisted mostly of observation. A good example of this is Adam Smith's description of a pin factory he had visited. The factory in question employed 10 workers and produced 48,000 pins per day. If each of the ten workers had done all the steps themselves, each worker could only produce only 10 or 20 pins per day. He was also a frequent visitor to Matthew Boulton's Soho Manufacture in Birmingham where he witnessed first hand the effects of what he would later refer to as fire power, but which was in actual fact the steam engine.

² On a personal note, this describes to a tee, my own training in economics.

The end result was the classical theory of production based largely on labor in short, output was an increasing function of the labor input. The latter's productivity, he argued, was increasing in specialization. His account of the workings of specialization (Chapter 1 of *The Wealth of Nations*) focused on (i) increased efficiency in performing a single task (ii) less time wasted changing tasks and (iii) the effects of machinery or fire power. Labor was viewed as the sole productive factor input, a view that would characterize the writings of all classical moral philosophers, including Frederick Engels and Karl Marx. In fact, the labor theory of value constituted the cornerstone of radical political economy

Revisionist 19th-Century Moral Philosophers

Radical political economy had a tsunami of an effect on classical thinking. After all, its cornerstone (i.e. the labor theory of value) was classical in origin. If labor was the source of all value, then it would only stand to reason that it and it alone would be entitled to the spoils. Profits or anything less than the full amount was akin to theft, of illegal appropriation on the part of the owners of the means of production, raising the question of how to justify, in a meaningful manner, profits, or roughly 30 percent of output being diverted?

Their response was swift. Less than five years after the publication of *Das Kapital* in 1867, classical political economists responded by simply decreeing capital to be physically productive, not unlike labor. The new classical, or neoclassical view was now that both labor and capital were physically productive and thus entitled, legally-speaking, to a share of the spoils.

Late 19th Century Moral Philosophers

By late 19th-century moral philosophers, it should be understood the likes of William Stanley Jevons, Alfred Marshall and Francis Edgeworth. Their methodology was three-fold in nature, consisting of (i) a reaction to radical thought (ii) the language of the emerging science of thermodynamics and (iii) a desire to formalize the analysis. Ironically, while they were the first moral philosophers to borrow from the realm of natural philosophy, notably from the field of thermodynamics where they focused on its form, namely language, and not on its content. The laws of thermodynamics were ignored, however, its form, namely differential calculus, became its language. The result was neoclassical consumer and producer theory.

Post-WWII Moral Philosophers

The post-WWII methodology consisted, primarily, of a call to the data, a call that would reveal the weakness of the neoclassical approach, namely that labor and capital, the two inputs, could explain, at best 50 percent of post-WWII growth. Needless to say, this came as a shock to the emerging field of economic growth.

The obvious explanation was technology, the black box of neoclassical production theory. And so was born, modern growth theory. Assuming a twice-differentiable, constant-return-to-scale production function, growth would be modeled as the sum of the weighted inputs growth-rates, and what was an error or fudge factor, namely the Solow residual. This remains the essence of modern growth theory. While the number of inputs has increased (KLEM and KLEMS production functions) and the residual

has been rechristened as total factor productivity (tfp), this is where things stood until the 1980s when a new class of models made their appearance, namely those of new, endogenous growth theory.

As it turned out, the residual wasn't a problem, that is until it disappeared. Throughout the 1950s and 1960s, theorists attempted to get a handle on what was driving the residual, without making any inroads. A good example is Edward Denison's pioneering work on U.S. economic growth. The productivity slowdown, however, changed everything. Their work, while interesting, was deemed to be inconclusive and in need of revision. The residual would now be the subject of inquiry, of formal inquiry. Technology, which had until then been seen as parametric, would now be endogenized. The result was Romer-type and Schumpeter-type growth models, known collectively as new growth theory.

Unfortunately, despite the flurry of activity which resulted, complete with Nobel prizes, growth remained and remains a mystery, a mystery that it was in the past, and the mystery it would become for the next four decades. Today, this is where the profession finds itself in so far as growth is concerned, namely still in the dark. This, however, has not stopped governments around the world from pursuing growth-enhancing (hoped for) policies, based on some of the notions found in this literature, but to no avail, leading some of the leading members of the profession to question its very relevance. According to Paul Krugman:

My own sense is that NGT never really had the elements needed to turn it into an intellectual success story; too much of it involved making assumptions about how unmeasurable things affected other unmeasurable things. It took off, briefly, partly because the subject is so important, and people wanted to be able to say something about it; meanwhile, business-cycle macro was then, as it is now, a deeply disputatious area riven by politics, and people were eager to talk about something else. In short, it was an intellectual bubble that eventually deflated of its own accord.

But it's still amazing, for someone who remembers the excitement of the time, how completely it has all vanished from the economics landscape. Krugman (2013), p. 3.

Material Processes as Seen by Natural Philosophers

Neoclassical moral philosophers, from Stanley W. Jevons to Paul Romer, hold that wealth is an increasing function of labor, capital and a technology scaler. Labor and capital are assumed to be physically productive as evidenced by such concepts as the marginal productivity of labor and the marginal productivity of capital. In more recent work, the laws that govern productivity are extended to inputs such as information and services.

This begs the question: how do applied physicists and engineers view these notions? How do they stack up against the laws of classical mechanics, thermodynamics and kinetics? The short answer is that they don't. According to classical mechanics, capital, defined as simple and complex tools, are not physically productive, not being a source of energy/force. Hence, the very concept of the marginal productivity of capital stands in violation of classical mechanics. According to classical mechanics, simple and complex tools are viewed as providing mechanical advantage, but are not physically productive as they are not a source of energy/force.

A similar argument applies to information, which according to contemporary moral philosophers is physically productive, having an output elasticity in the order of 6 percent (references). Such a view

has no equivalent in natural science, where information is seen as definitional and not physically productive. More and/or better information acts on output via second-law efficiency, or to put it more simply, on the efficiency of energy use. James Watt's external condenser is an example of better information increasing the energy efficiency of a ton of coal.

Consider next the labor input which as shown above, was one of the first inputs to be examined by moral philosophers (Smith, Ricardo, Mill, Marx). By the mid-to-late 19th century, the marginal productivity of labor had become the key element in all of moral philosophy's view of wealth creation. The classical model of wealth creation is labor-centric, having just labor as the prime input. This would become Marx's *casus belli* and the foundation of radical political economy, not to mention the socialist and communist doctrines. Interestingly and ironically, labor is completely absent from the current process engineering and manufacturing engineering textbooks. Despite being the cornerstone of past and present analysis, labor is deemed to be irrelevant to process engineers – with good reason, it is a supervisory or organizational input, having no bearing on physical outcomes. Late 19th-century moral philosopher Alfred Marshall acknowledged this new reality, referring to labor as “machine operatives.”

This leads us to the obvious conclusion that the principles that underlie to the point of defining moral philosophy-based neoclassical production theory stand in violation of basic natural philosophy – or basic science. Put differently, labor and capital cannot explain wealth as neither is physically productive. Combined with the standard Solow residual, it would stand to reason that current production theory cannot explain anything. Put differently, two non-physically productive factors and an accounting residual do not a theory of wealth or growth make.

Today, material processes in the known universe are widely understood, except in economics. They are, for the most part, based on the laws of classical mechanics, the laws of thermodynamics and the laws of kinetics. Historically, the laws of classical mechanics predate early political economy by roughly a century. The laws of thermodynamics, however, were discovered in the mid-19th century, and the laws of kinetics,

The Dissenting Moral and Natural Philosophers

At no time in its 250 year history did mainstream moral philosophers-turned political economists invoke the basic scientific laws that governed material processes. However, we would be amiss to argue that none dabbled with/flirted with elementary physics in their writings. In this section, we present a series of incursions by moral philosophers into the realm of natural science as well as the reverse, namely incursions by natural philosophers into the realm of moral philosophy.

Karl Marx's Das Kapital 1867

Karl Marx's *Das Kapital*, published in 1867, is today considered to be a classic in 19th century political economy, having laid out the bases for the labor theory of value, the rate of surplus value and Marxian economics in general. Starting from classical production theory where wealth is an increasing function of the labor input, he went on to elaborate a theory of the laws of motion of capitalism based on technological change, declining wages and rising profits. Capitalism, he argued, contained the seeds of its own destruction. Policy-wise, the implications were straightforward: profits were a form of theft and justice could only be done if surplus value was returned to its rightful owners (and only productive factor input).

The bulk of these ideas are found in the first few chapters of *Das Kapital*. However, in Chapter 15, entitled "Machinery and Modern Industry", he provided an altogether different account of production, one based on classical mechanics, and one that could very well rival any engineering manual of the day. In short, he described, at length, the steam engine and force in general as the motive power and force behind industrial production. Consider the following quotation, taken from Chapter 15 of Volume 1 of Karl Marx's *Das Kapital*, entitled "Machinery and Modern Industry".

Mathematicians and mechanics, and in this they are followed by a few English economists, call a tool a simple machine, and a machine a complex tool. They see no essential difference between them, and even give the name of machine to the simple mechanical powers, the lever, the inclined plane, the screw, the wedge, etc. As a matter of fact, every machine is a combination of those simple powers, no matter how they may be disguised. From the economic standpoint this explanation is worth nothing, because the historical element is wanting. Another explanation of the difference between tool and machine is that in the case of a tool, man is the motive power, while the motive power of a machine is something different from man, as, for instance, an animal, water, wind, and so on. According to this, a plough drawn by oxen, which is a contrivance common to the most different epochs, would be a machine, while Claussen's circular loom, which, worked by a single labourer, weaves 96,000 picks per minute, would be a mere tool. Nay, this very loom, though a tool when worked by hand, would, if worked by steam, be a machine. And since the application of animal power is one of man's earliest inventions, production by machinery would have preceded production by handicrafts. When in 1735, John Wyatt brought out his spinning machine, and began the industrial revolution of the 18th century, not a word did he say about an ass driving it instead of a man, and yet this part fell to the ass. He described it as a machine "to spin without fingers."

All fully developed machinery consists of three essentially different parts, the motor mechanism, the transmitting mechanism, and finally the tool or working machine. The motor mechanism is that which puts the whole in motion. It either generates its own motive power, like the steam-engine, the caloric engine, the electromagnetic machine, etc., or it receives its impulse from some already existing natural force, like the water-wheel from a head of water, the wind-mill from wind, etc. The transmitting mechanism, composed of fly-wheels, shafting, toothed wheels, pullies, straps, ropes, bands, pinions, and gearing of the most varied kinds, regulates the motion, changes its form where necessary, as for instance, from linear to circular, and divides and distributes it among the working machines. These two first parts of the whole mechanism are there, solely for putting the working machines in motion, by means of which motion the subject of labour is seized upon and modified as desired. The tool or working machine is that part of the machinery with which the industrial revolution of the 18th century started. And to this day it constantly serves as such a starting-point, whenever a handicraft, or a manufacture, is turned into an industry carried on by machinery. (Marx 1867, 261).

One wonders how and indeed why the writer who penned these words and thoughts could go on to defend the labor theory of value and all that it implies (i.e. its many variations). Clearly, Marx had devoted a considerable amount of time to understanding the physics of material processes, specifically

focusing on classical mechanics. In short, he understood the role of power, as well as the notions of simple and complex machines.

All of this, however, was inconsequential as it was summarily ignored, sacrificed on the ideological altar of distribution issues and concerns. Had he taken his analysis to its logical conclusion, he would have concluded that neither labor (supervisory input) nor capital (tools) were physically productive, and that only energy/force/power was. Distribution would involve sharing the final output, not on productivity grounds, but on the basis of a bargaining process (i.e. bargaining power).

William Stanley Jevons' The Coal Question and The Theory of Political Economy

As pointed out, Karl Marx sacrificed science and conscience on the ideological altar of distribution, with the known consequences and results. Clearly, the world would have been better off had science mattered to him. Another such case is that of William Stanley Jevons who today stands as the key architect of modern neoclassical economics. In 1865, he published a short book entitled *The Coal Question; An Inquiry Concerning the Progress of the Nation, and the Probable Exhaustion of Our Coal Mines*. As the title suggests, Jevons was very much concerned about what was an obvious issue in the case of the finite resource that was coal, namely its eventual exhaustion. Clearly, he viewed coal as one of, if not the key factor input in the industrial revolution and thus, of the industrial era. Consider his opening lines:

Day by day it becomes more evident that the Coal we happily possess in excellent quality and abundance is the mainspring of modern material civilization. As the source of fire, it is the source at once of mechanical motion and of chemical change. Accordingly, it is the chief agent in almost every improvement or discovery in the arts which the present age brings forth. It is to us indispensable for domestic purposes, and it has of late years been found to yield a series of organic substances, which puzzle us by their complexity, please us by their beautiful colours, and serve us by their various utility.

And as the source especially of steam and iron, coal is all powerful. This age has been called the Iron Age, and it is true that iron is the material of most great novelties. By its strength, endurance, and wide range of qualities, this metal is fitted to be the fulcrum and lever of great works, while steam is the motive power. But coal alone can command in sufficient abundance either the iron or the steam; and coal, therefore, commands this age—the Age of Coal.

Coal in truth stands not beside but entirely above all other commodities. It is the material energy of the country—the universal aid—the factor in everything we do. With coal, almost any feat is possible or easy; without it we are thrown back into the laborious poverty of early times. (Jevons 1865, 14).

To Jevons, coal or energy was the mainspring of modern civilization, being the source of fire, mechanical motion and chemical change. Clearly, at this point in his career, science mattered. As he put it, “coal in truth stands not besides but entirely above all other commodities.” Fast forward to 1872, five years after the publication of Marx’s *Das Kapital* which had stood classical economics, especially distribution, on its head, and the publication of his *magnum opus*, *The Theory of Political Economy* which would go on to define modern neoclassical economics. Surprisingly, but not unexpectedly,

coal/energy is conspicuous by its very absence. Seven years later, coal had gone from hero to zero. Wealth was an increasing function of labor and capital, period. More importantly, capital was decreed to be physically productive, thus not only contravening classical mechanics, but providing a pat response to the growing radical movement. Clearly, by then science no longer mattered as ideological considerations took precedence over intellectual integrity.

Nicholas Georgescu-Roegen's The Entropy Law and the Economic Process 1971

Nicholas Georgescu-Roegen's *The Entropy Law and the Economic Process* (1971) is another example of basic science at the core of economics. Its premise is straightforward, namely that thermodynamics is based on two laws: The first law states that energy is neither created nor destroyed in any isolated system (a conservation principle). The second law of thermodynamics – also known as the entropy law – states that energy tends to be degraded to ever poorer qualities (a degradation principle).

Georgescu-Roegen argued that the relevance of thermodynamics to economics stems from the physical fact that man can neither create nor destroy matter or energy, only transform it. The usual economic terms of 'production' and 'consumption' are mere verbal conventions that tend to obscure that nothing is created and nothing is destroyed in the economic process – everything is being transformed.

He recognized that capital as defined in economics was not physically productive. Rather, that role was assumed by energy. In Georgescu-Roegen's terminology, energy may have the form of either a stock factor (mineral deposits in nature), or a flow factor (resources transformed in the economy); but never that of a fund factor (man-made capital in the economy). Hence, in response to Robert Solow's 1974 claim that capital could be substituted for energy, he argued that such a substitution is physically impossible.

Unfortunately, his message was lost on production theory which remained unfettered (i.e. neoclassical). While entropy, or the degradation of matter is today recognized, especially in ecological economics, the role of negentropy in production continues to be ignored. There were also incursions by natural philosophers into the realm of moral philosophy.

Charles Babbage's On the Economy of Machinery and Manufactures 1832

Perhaps the earliest attempt at invoking basic science as a guide to understanding industry was that of polymath Charles Babbage in 1832. In *On the Economy of Machinery and Manufactures*, he provided perspicacious descriptions of the new technology. Consider, for example, the following excerpt where classical mechanics is used to illustrate the contribution of wind, water, and steam.

Of those machines by which we produce power, it may be observed, that although they are to us immense acquisitions, yet in regard to two of the sources of this power, the force of wind and of water, we merely make use of bodies in a state of motion by nature; we change the directions of their movement in order to render them subservient to our purposes, but we neither add to nor diminish the quantity of motion in existence. When we expose the sails of a windmill obliquely to the gale, we check the velocity of a small portion of the atmosphere, and convert its own rectilinear motion into one of rotation in the sails; we thus change the direction of force, but we create no power....The force of vapour is another fertile source of moving power; but even in

this case it cannot be maintained that power is created. Water is converted into elastic vapour by the combination of fuel. (Babbage 1832, 15)

Interestingly, he devoted a whole chapter to speed or what he referred to as “velocity.” Chapter 4, entitled “Increase and Diminution of Velocity,” showcased using industry-specific examples the role of increased machine speed as a key feature of mechanization.

In turning from the smaller instruments in frequent use to the larger and more important machines, the economy arising from the increase in velocity becomes more striking. In converting cast into wrought iron, a mass of metal, of about a hundred weight, is heated almost to white heat and placed under a heavy hammer moved by water or steam power. This is raised by a projection on a revolving axis; and if the hammer derived its momentum only from the space through which it fell, it would require a considerably greater time to give a blow. But it is important that the softened mass of red-hot iron should receive as many blows as possible before it cools, the form of the cam or projection on the axis is such, that the hammer, instead of being lifted to a small height, is thrown up with a jerk, and almost the instant after its strikes a large beam, which acts as a powerful spring, and drives it down on the iron with such velocity that by these means about the double the number of strokes can be made in a given time. (Babbage 1832, 26)

Whereas previous writers referred to specialization, Babbage provides a detailed account of the role of power in material processes in general, and the role of steam power in U.K. manufacturing. Further, he perspicaciously was the first to formalize the role of rotary motion/power in material processes, alluding to the importance of velocity or put differently, machine speed. To Babbage, science mattered. Unfortunately, Babbage did not matter to political economy as evidenced by his absence from the overall record.

Frederick Soddy's 1921 *Cartesian Economics*

Another early 20th century dissenter was 1921 British Nobel-prize laureate chemist Frederick Soddy, who after his pioneering work with Ernest Rutherford on atomic transmutation turned his attention to economics, largely in response to the alleged “misspecification” of production theory, more to the point, to the absence of energy from the analysis. The gist of his critique can be found in the following allegory:

At the risk of being redundant, let me illustrate what I mean by the question, How do men live? by asking what makes a railway train go. In one sense or another the credit for the achievement may be claimed by the so-called ‘engine-driver’, the guard, the signalman, the manager, the capitalist, or share-holder, or, again, by the scientific pioneers who discovered the nature of fire, by the inventors who harnessed it, by labour which built the railway and the train. The fact remains that all of them by their united efforts could not drive the train. The real engine-driver is the coal. So, in the present state of science, the answer to the question how men live, or how anything lives, or how inanimate nature lives, in the sense in which we speak of the life of a waterfall or of any other manifestation of continued liveliness, is, with few and unimportant exceptions, By sunshine. Switch off the sun and a world would result lifeless, not only in the sense of animate life, but also in respect of by far the greater

part of the life of inanimate nature. The volcanoes, as now, might occasionally erupt, the tides would ebb and flow on an otherwise stagnant ocean, and the newly discovered phenomena of radioactivity would persist. But it is sunshine which provides the power not only of the winds and waters but also of every form of life yet known. The starting point of Cartesian economics is thus the well-known laws of the conservation and transformation of energy, usually referred to as the first and second laws of thermodynamics. (Soddy 1921, xi)

In short, according to Soddy, energy is the cornerstone of all human activity, including production. Labor, capital, information, technology etc. are all accessory inputs, necessary for but not the actual source of wealth. Despite much promise, the proposed Cartesian economics, based on the laws of basic physics (mechanics and thermodynamics) failed to make inroads into mainstream economics.

F.G. Tryon

To many observers in the early 20th century, the U.S. was in the midst of an industrial revolution, one to which the economics profession appeared to be oblivious. F.G. Tryon of the Institute of Economics (Brookings Institution) was among the first to point to the incongruity between production processes as modeled in economics and those observed in early 20th century America.

Anything as important in industrial life as power deserves more attention than it has yet received by economists. The industrial position of a nation may be gauged by its use of power. The great advance in material standards of life in the last century was made possible by an enormous increase in the consumption of energy, and the prospect of repeating the achievement in the next century turns perhaps more than on anything else on making energy cheaper and more abundant. A theory of production that will really explain how wealth is produced must analyze the contribution of this element of energy.

These considerations have prompted the Institute of Economics to undertake a reconnaissance in the field of power as a factor of production. One of the first problems uncovered has been the need of a long-time index of power, comparable with the indices of employment, of the volume of production and trade, of monetary phenomena, that will trace the growth of the factor of power in our national development [Tryon (1927),281].

Howard Scott's Technocracy

In little time, this incongruity reached academia, specifically Columbia University where a group of engineers, known as the *Technocracy Alliance*, outrightly rejected mainstream approaches to understanding wealth (essentially neoclassical production theory), arguing that they ignored mechanics, thermodynamics, process engineering and with the then state of the art regarding material processes in general.

Foremost in the minds of the “dissidents” was the fact that while America’s capacity to produce wealth was increasing, actual wealth appeared to be stagnant, prompting various calls to action. One such call came from the engineering department at Columbia, where Walter Rautenstrauch and Howard

Scott launched the technocracy movement. In short, it contended that mainstream economics in general and production theory in particular were irrelevant, not to mention incomplete and unscientific, and were in need of a major overhaul. The latter would be grounded in thermodynamics in general and in energy in particular. In short, while perhaps not fully aware of it, the Technocrats were attempting to steer economics back on to a course similar to that taken by thermodynamics in the 19th century, one based on the scientific underpinnings of material processes in economics.

For example, *in Introduction to Technocracy*, by Howard Scott, published in 1933, the first 10 pages contained a rendition of basic applied physics, thermodynamics and kinetics. This would then constitute the basis of the new science of wealth, one based on the laws of physics.

The eighteenth century saw the introduction of the powered machine, which was first conceived as an extension of the hand operations of craftsmen. The close of the nineteenth century witnessed the machine process occupying a dominant place in the technological scheme and reshaping men's habits and methods of thinking. The turn of the century marked the introduction and the accelerating rise, under guidance of science of the modern, continuous technological processes of production. In this new industrial order, the machine was no longer conceived as an extension of the hand tool; it became a moving mechanical element in a sequence of events, the course and rate of which had been arranged and ordered in strict accordance with the exact quantitative calculations of science. Men in the fields of scientific inquiry and technological research, the same as those directly engaged in technological employment, gradually ceased to think in terms of workmanlike efficiency of a given cause working to like effect: they began to think in terms of process. (Scott 1933, 8)

As mentioned, the driving force was the view that energy-related innovations (electric unit drive in particular) had increased America's ability to produce without a concomitant increase in income and expenditure, leading to stagnation, unemployment and a full-blown depression. The movement offered both a detailed diagnosis of the problem as well as a series of corrective measures/reforms (an energy monetary standard, guaranteed income). It, however, lost much of its appeal with the rise of Keynesian economics, which provided a less radical fix. In short, animal spirits replaced the energy shock as the cause of the depression.

Such boldness, especially from outsiders, was met with great resistance from moral philosophers. For example, University of Chicago economics professor Aaron Director, in a pamphlet entitled, *The Economics of Technocracy*, seriously doubted its usefulness, arguing that mainstream economics and production theory was better suited to analyze the issues it sought to address. To begin, he summarized Technocracy in terms of six points:

The importance of energy: —Through the expenditure of energy we convert all raw materials into products that we consume and through it operate all the equipment that we use." This, of course, has always been familiar to us, except that it was stated in terms of work, and not of energy. The great merit of the latter term is the possibility of dragging in the Law of Conservation of Energy and this marrying physics to the social mechanism.

Energy can be measured, and the unit of measurement is always the same, while the dollar varies from time to time. The chief distinction between our society and that of all previous societies is the much greater amount of energy which can be generated. This

has always been recognized by the designation of our civilization as the machine era. With every increase in the amount of mechanical energy the need for labor decreases. The present depression marks the end of an era, since the increase in mechanical energy has at last become so great that, regardless of what happens, the need for human labor will rapidly decline. Does it follow, therefore, that the price system must break down, and that only the engineers can run a mechanical civilization. (Director 1933, 8)

He then proceeded to re-examine, using standard neoclassical analysis, each of these points. In keeping with the 19th century tradition of equating energy with machinery, the shock was cast in terms of “technical progress,” and not of energy deepening. This was then followed by a Ricardian-inspired analysis of the effects of “technical progress” on costs, wages and prices.

Competition, he argued, was a sufficient condition for full employment. On the other hand, the technocrats maintained that a more scientific utilization of existing equipment would result in a much larger product: “It is only necessary to insist that the number of engineers in industry far outweigh the number of economists, and if these engineers are to run industry in the future, they should be competent to point out methods of improving efficiency. It is not enough to hide behind a barrage of words. It should be patent to the most critical observer that the one thing which the individual enterprise under competitive conditions does strive for is to reduce its cost, regardless of the consequences on employment.’ (Director 1933, 16)

Having concluded that “technical progress is not incompatible with full employment,” he proceeded, in Chapter VII, to debunk the view that the Great Depression was the result of energy-based technological change. This, metaphorically speaking, is where the gloves came off. First, he, in the tradition of Say and Ricardo, ruled out underincome. Output, he argued, is identically equal to income, whether in the form of money or in kind.

If there were no commercial banking system, the national income would be distributed for consumption goods and the production of additional equipment in accordance with the desires of the community. The output of industry is equal to the income of the laborers employed in it and of the property owners whose capital is invested in it. Clearly, if entrepreneurs borrowed funds directly from the income receivers, they could not continue to produce capital equipment in excess of the amount which income receivers were willing to save. (Director 1933, 21)

In short, according to Director, Technocracy offered nothing new, and, more importantly, was riddled with the most elementary of oversights and errors. Energy was nothing new, and, more importantly, presented no particular challenge to mainstream political economy. Technological progress, in this case, electric drive, increases, in a commensurate fashion, income, wages and profits. The causes of the Great Depression, he argues, lie elsewhere, notably in “the war, the resulting debts, and tariffs.”

Economic Growth from the Point of View of Natural Philosophy

Given that wealth creation is a material process, it stands to reason that its study would be consistent with the laws of classical mechanics, thermodynamics and kinetics. More to the point, wealth should

be modeled as an increasing function of power usage. This is an inarguable fact. Anything less would be a violation of the laws of physics.

The point is that the Solow residuals reported in the post-WWII period cannot exist in such a world, thus raising the question, is there any evidence of this? In 1982, German physicist Reiner Kummel, in a paper published in *Energy*, showed that if energy is properly included in a neoclassical-like production function (LINEX), the post-WWII Solow residuals and productivity slowdown could be explained by energy, specifically, electric power use. High post-WWII growth in electric power usage explained all output growth, and a decrease in the rate of growth of electric power usage in the 1970s explained the slowdown in growth. Beaudreau (1995) showed similar results by using output elasticities obtained by estimating a Cobb-Douglas function defined over capital, labor and electric power for U.S. manufacturing, directly as opposed to indirectly which is the standard. He found an output elasticity of 0.64 which is decidedly greater than previous estimates in the 0.04-0.06 range.

More recently, Beaudreau (2017,2020) invoked the laws of kinetics to show that most of output growth over the past two centuries owed to increases in the speed/velocity of the myriad material processes that together constitute an economy. The steam engine-driving belting and shafting and the steam engine-driving individual electric motors (i.e. electric unit drive) increased process speeds (relative to artisanal techniques), thus increasing hundreds-fold, the wealth of the world.

Having shown that speed and acceleration could account for the phenomenal growth of the post-WWII period, he argued that the upper limits (of process speeds) were reached in the 1960s and 1970s, making further increases unfeasible. For example, he points to airplane speed as a metaphor, where speeds increased throughout the post-WWII period, only to peak in the 1960s (and have actually decreased since).

The Productivity Slowdown according to Natural Philosophy

The data show a marked decrease in the rate of growth of electric power usage during and after the 1970s, raising the question of why. Why did it suddenly fall, bringing with it productivity and output growth? The general view (Kummel...Beaudreau) was that the OPEC-engineered oil embargoes (1973 and 1979) and the ensuing energy crises had put an end to centuries of energy deepening. This view, however, fell out of favor as real energy prices returned to their pre-OPEC crises levels, and yet, energy use growth has been anemic to non-existent. As mentioned above, the reason appears to be rooted in kinetics and the end of what Beaudreau referred to as the "age of speed."

Why Were/Are the Material Sciences Ignored?

Our findings so far raise a number of interesting questions. One such question is why dialogue with what are closely related fields was and is virtually non-existent in economics? Why haven't process engineers teamed up with growth theorists to understand the intricacies of past (and hopefully future) growth? Why have the very people who have a first-hand understanding of the very material processes underlying growth been shut out, not so much as even consulted? In this section, we present a non-exhaustive list of reasons, from the early history of the discipline, to the ideology and propaganda of the 19th century, to the medium of diffusion of results (journals as opposed to books), to the creation of a Nobel prize.

Tabula Rasa

The first reason we advance has to do with the very history of the discipline, namely that it predates its tributary disciplines. Economics has a history that dates back to the mid-18th century, a time when classical mechanics as a field was in its infancy and thermodynamics was altogether non-existent. Moreover, early work such as Adam Smith's "An Inquiry into the Nature and Causes of the Wealth of Nations" was about the newly-discovered, Watt steam engine. As such, when Smith was confronted with the daunting task of describing the effects of the steam engine on wealth, he had to resort to primitive notions, couching his analysis in what was a Paleolithic, labor-centric view of production, one that focused on labor. This became known as the classical theory of production, with a single factor input, namely labor. Chapter 1 of the *Wealth of Nations* enumerates the various ways in which specialization (code for the adoption of the steam engine) increases labor productivity.

From a purely Newtonian point of view, this was a breach, as the steam engine had, for all intents and purposes, replaced labor as the source of work, transforming it into a mere organizational factor input, overseeing the workings of machinery—what Alfred Marshall would, a century later, refer to as machine operatives. That this be the case is not surprising as Smith, a moral philosopher, was not a natural philosopher (i.e. schooled in Newtonian physics). Not helping matters was the fact that steam as a force was not well understood—in fact, not understood at all. It would take a century before thermodynamics, the science of heat, would do so.

However, economics or political economy could not wait. The introduction of the steam engine and its widespread adoption in the 19th century with all the associated problems and challenges, obviated the need for a discipline, however imperfect or unscientific. Among the most pressing problems was the business cycle and the apparent failure on the part of England to make a successful transition to the new, higher GDP in response to the steam engine. Rather than greater wealth, the steam engine ushered in periods of higher unemployment and misery.

The Labor Theory of Value and the Problem of Existence and Stability of Equilibria

This, however, raises an interesting question, namely that while it is true that economics predates the fundamental fields, why were their insights not incorporated at a later date? In other words, why did economics not evolve, why did it not update itself? The answer, we argue, lies with two developments, namely the rise of radical economics in the early-to-mid 19th century with Karl Marx as its main proponent, and second, the resulting allegation that private market economies were inherently unstable (i.e. Harrod Instability), and more importantly, contained the seeds of their own destruction. Both of these were instrumental in the widening divide between economics and fundamental science, notably thermodynamics.

Karl Marx's magnum opus, *Das Kapital* published in 1867 was a turning point of sorts, as it turned classical production theory on its head. If labor was the only productive factor input, then it stood to reason that the owners of labor were the only ones entitled to the spoils. In short, profits were a form of theft. This followed from the fact that capital was not physically productive. The classical response was swift, coming with the publication of William Stanley Jevons' *The Theory of Political Economy* in 1872 where capital was simply decreed to be productive. Using the language of thermodynamics, it was decreed to be physically productive, complete with a marginal productivity, thus justifying profits

as legitimate, both physically and legally, The result was neoclassical production theory based on two, non-physically-productive factor inputs.

This, we maintain, *de facto* stifled progress in the field as it provided the long-sought legitimization of profits not as a form of theft, but as being earned or merited. Any and all critiques were dismissed outright, as they constituted a clear and present threat to the established order.

Another factor that *de facto* stifled progress was the problem of equilibrium, specifically system-wide, macroeconomic or general equilibrium. One of the key predictions of radical economics was the inevitability of overall, systemic collapse. According to Karl Marx, capitalism contained the seeds of its own destruction. Given the recurrent downturns in U.K. GDP throughout the 19th century, some greater than others, this became a going concern. Clearly, the onus was on classical and neoclassical economists to prove, mathematically or otherwise, that private market economics could reach a full-employment equilibrium, one that was unique and most importantly, stable. From the late 19th century onwards, the quest to prove that such an equilibrium existed would occupy the thoughts of leading figures such as Leon Walras and Vilfredo Pareto.

However, as their work makes clear, the task was far from obvious. In short, to arrive at such a proof, the starting point had to be simple, namely excess demand functions that were analytical. And this required a simple model of consumer and producer behavior. This would continue to be the case in the 20th century when new methods from topology would be used (Brouwer and Kakutani's fixed-point theorems).

As has been the case in all highly-formalized work involving advanced optimization techniques, the starting point had to be as simple as possible. This, we argue, has contributed to stifling even further, the emergence of more consistent models of consumer and producer behavior. Put differently, mathematical elegance and tractability pre-empted more realistic approaches to consumer and producer behavior. A case in which formalization acted and continues to act as a constraint on progress.

Moreover, this had a rather pernicious effect on first principles. Specifically, the profession reverse engineered, as it were, the results of GE analysis to first principles—consumer and producer theory. Simple $\max U(x)$ and $\max \pi(q)$ became the standard in microeconomics, thus pre-empting any and all refinements. After all, anything other would negate GE analysis and results.

The Decline of Pamphlets/Treatises/Volumes and the Rise of Scholarly Journals

For most of its history, the findings in economics were diffused through either pamphlets or books. In fact, most of that which today constitutes the core curriculum in modern economics originated in pamphlets or books, not in journal articles. While this to most will appear or seem irrelevant or inconsequential, we believe that it has an important bearing on the evolution of economics. Specifically, journal articles are not, in general, conducive to Kuhnian-like paradigm shifts in thought, owing in large measure to the length and purview of the contents. In short, journal articles are more conducive to the propagation of, the refinement of, and the testing of the canons of the field/science. For example, in economics, articles on consumer theory seek to validate, refine, or extend the basic utility maximization model. To my knowledge, there is not one article that single-handedly changed the course of a field or the profession itself.

Historically, economic journals evolved from being a combination of book reviews and short articles/comments to exclusively devoted to the latter. Take, for example, the American Economic Review, founded by a group of politically and religiously-minded scholars, which in its early years devoted more space to book reviews as it did to articles. Figure 1 shows the contents of the inaugural volume of the American Economic Review.³ What is particularly noteworthy is the fact that of the seven pages of content, six and one-half are book reviews, the other half being articles. In other words, it accorded more importance, in so far as the advancement of the field was concerned, to new ideas/concepts than it did to refinements of existing ones. The same was true of the Journal of Political Economy whose inaugural number contained 36 book reviews and 24 articles.

Figure 1: American Economic Review 1911 Table of Contents

The image shows a scan of the 1911 Table of Contents for The American Economic Review. The table is organized into several columns. The first column lists the title 'The American Economic Review' and the publisher 'The American Economic Association'. The second column lists the board of editors: E. W. Kemmerer, H. B. Garrison, H. C. Taylor, J. H. Slosser, and D. B. Dyer. The main body of the table lists articles and book reviews with their respective authors and page numbers. The articles section includes 'The Moral Standard of the Nation' by C. C. Smith, 'The History of the American Economy' by J. H. Slosser, and 'The Moral Standard of the Nation' by C. C. Smith. The book reviews section is extensive, covering works by various authors such as W. W. Rostow, J. H. Slosser, and C. C. Smith. The table also includes a section for 'NOTES, DOCUMENTS, REPORTS, AND LEGISLATION' and a 'FIFTH LIST OF DOCTORAL DISSERTATIONS IN POLITICAL ECONOMY'. The page number '1911' is printed at the bottom of the table.

This changed in the post-WWII period when the focus shifted away from book reviews, over to journal articles exclusively. One could argue that this was the result of two developments, namely the rise of Keynesian macroeconomics and the publication of Paul Samuelson's Foundations of Economic Analysis, both of which served to provide the field with a pseudo-scientific set of laws. Both became the reference and thus starting point in work for years to come. Interestingly, neither had anything to do with fundamental science, despite the highly mathematical nature of Foundations of Economic Analysis.

This shift had the unfortunate effect of stifling progress in what could be referred to as economic fundamentals. Today, consumer theory remains largely unchanged as does the theory of the firm. While economics has witnessed the introduction of new, more sophisticated analytical techniques

³ As Benjamin Friedman has pointed out, the origins of the American Economic Association were firmly rooted in 19th century moral philosophy/religion (See Friedman 2024).

(dynamic optimization, duality etc.), its core has remained largely unchanged. Few leading journals are prepared to take risks, with the result that little progress has been observed. Add to this the fact that the gatekeepers (i.e. the editors) have a stake in the existing paradigm and you get a form of sclerosis, where journals essentially reproduce existing knowledge.

A Nobel Prize in Economics

Perhaps the crowning achievement of the economics profession in so far as its scientificity is concerned was the creation in 1968 of a Nobel prize in economic sciences. For one, it de facto consecrated economics as a bona fide science, distinct from all other social sciences (moral philosophy), thus dissipating any and all doubts as to its “scientific” status. However, examining in detail the various laureates and their contribution, what stands out is the lack of connection with the other scientific Nobel prizes—that is in physics, chemistry and medicine.

In many instances, prizes given in medicine could well have been given in chemistry or physics, and vice-versa, a testimony of the universal nature of science (fundamental and applied). For example, the 1997 prize in Medicine, awarded to Paul Boyer for his research on ATP could well have been awarded in chemistry or physics for that matter.

Despite the fact that wealth creation is a material processes, like all other material processes in the known universe, no such collegiality exists in economics. Not one of the prizes in economics could have been awarded in the other three scientific categories. One could argue that this is evidence that science does not, *de facto*, matter.

Conclusion

All in all, it can be concluded that despite what were valiant attempts, moral philosophers’ quest over the past two and one-half centuries to understand what are natural philosophy-based phenomena, namely the creation of wealth and its growth, has been a failure, and this on two fronts, namely in so far as the development of realistic models of production, and second, their eschewal of outside natural philosophers’ attempts to inject the laws of the natural world into the analysis of wealth and growth.

Moses Abramovitz, one the leading moral philosophers in the field of economic growth, in a moment of clarity – or an epiphany of sorts - referred to the Solow residual as a “measure of ignorance.” The findings of this paper lead us to qualify this statement as follows, namely that the Solow residual is “a measure of moral philosophers’ ignorance of the very laws that govern material processes as set out by natural philosophers.” This has resulted in the current state of affairs in which material processes and growth are understood in virtually all other fields, except economics.

While this will appear to most to be a harsh, even damning judgement of the economics profession as a whole, it is not. If anything, it is a wake-up call. After all, economics is first and foremost about wealth, and because wealth is a material process, it stands to reason that it has to be understood as such. Inventing concepts and notions that violate the laws of physics is no way to lay the scientific foundations of the applied material science that is economics. The on-going failures of the profession to understand past, present and future growth stands as a stark reminder of the need for a major reset.

References

- Abramovitz, Moses (1956). Resource and output trends in the United States since 1870.
- Alting, Leo. (1994). Manufacturing Engineering Processes. New York, NY: Marcel Decker Inc.
- Babbage, Charles (1832). Sources of the Advantages arising from Machinery and Manufactures," (Chapter 1), On the Economy of Machinery and Manufacturing, London: C. Knight, 3-20.
- Beaudreau, Bernard C. (2020). The Economics of Speed, Machine Speed as the Key Factor in Productivity, Zurich: Springer Nature.
- Beaudreau, Bernard C. (2017). "The Economies of Speed, $KE=1/2mv^2$, and the Productivity Slowdown," Energy, 124, 100–113.
- Denison, Edward F. (1962). The Sources of Economic Growth in the United States and the Alternatives Before Us. New York, NY: Committee for Economic Development.
- Denison, Edward F. (1985). Trends in American Economic Growth 1929–1982. Washington, DC: The Brookings Institution.
- Director, Aaron (1933). The Economics of Technocracy, Chicago, IL: University of Chicago Press.
- Friedman, Benjamin (2024). Religious Influences on Economic Thinking: The Origins of Modern Economics., Cambridge, MA: MIT Press.
- Georgescu-Roegen, Nicholas (1971). The Entropy Law and the Economic Process, Cambridge, MA: Harvard University Press.
- Jevons, W.S. (1865). The Coal Question, Chapter 1. London: Macmillan and Co.
- Jevons, W.S. (1965[1874]). The Theory of Political Economy, New York, NY: Augustus M. Kelley, Bookseller.
- Kummel, Reiner (1982). The Impact of Energy on Industrial Growth, Energy 7(2), 189-201.
- Krugman, Paul (2013) "The New Growth Fizzle," The New York Times, August 18, 2013.
- Marshall, Alfred (1890). Principles of Economics, London: Macmillan and Co.
- Marx, Karl (1906[1867]). "Machinery and Modern Industry," in Marx, Karl, Das Kapital(Chapter 15), New York, NY: The Modern Library.
- Romer, Paul(1986). Increasing Returns and Long-Run Growth, The Journal of Political Economy, Vol. 94, No. 5, 1002-1037.
- Scott, Howard et al. (1933). Introduction to Technocracy, New York, NY: The John Day Company.
- Smith, Adam (1990[1776]). "Of the Division of Labour," (Book I, Chapter 1), An Inquiry into the Nature and Causes of the Wealth of Nations, Chicago, IL: Encyclopaedia Britannica, 1–12.
- Soddy, Frederick (1921). Cartesian Economics, The Bearing of Physical Sciences upon State Stewardship, London: Hendersons.
- Tryon, Frederick G., (1927). An Index of Consumption of Fuels and Water Power," Journal of the American Statistical Association, 22, 271-282.

Author contact: bernard.beaudreau@ecn.ulaval.ca

SUGGESTED CITATION:

Bernard C. Beaudreau, "The Solow residual or what happens when moral philosophers try their hand at natural philosophy", *real-world economics review*, issue no. 112, December 2025, pp. 66- 85, <http://www.paecon.net/PAEReview/issue112/Beaudreau112.pdf>

You may post and read comments on this paper at <http://rwer.wordpress.com/comments-on-rwer-issue-112/>

Teaching Economics of Populism

Junaid B. Jahangir

[MacEwan University, Canada]

Copyright: Junaid Jahangir, 2025

You may post comments on this paper at

<http://rwer.wordpress.com/comments-on-rwer-issue-no-112/>

Abstract

The objective in this paper is to list the salient ideas in the economics of populism to provide a lesson plan at the introductory and elective levels in economics. This is achieved through a literature review and book reviews in the economics of populism, the economics of hate, the political economy of both populism and hate, and popular books by noted academics, Jason Stanley and Yuval Noah Harari. A list of salient ideas is highlighted and complemented with video clips including 'The Mob Song' from Disney. Activities based on parsing song lyrics, contrasting viewpoints, and sample questions are outlined for the purpose of teaching the economics of populism.

Keywords: economics of populism; economics of hate; fascism; right-wing populism; identity politics.

JEL Classification: A22; Y3.

There is no conflict of interest

1. Introduction

In his textbook, Komlos (2023) deals with topics like racism and populism that are not conventionally covered in mainstream textbooks. Specifically, he argues that mainstream economics textbooks ignore the social and political impacts of economic policy such as backsliding democracy, the surge of populism, and the rise of authoritarian leaders (p. 299). Indeed, there is no index entry for populism in the Mankiw, Kneebone, McKenzie (2024) textbook, which I use for ECON 101. Thonnessen (2023) notes that even the CORE textbook, which stands as a major alternative to mainstream textbooks, contains indifference curve analysis that are unnecessary to understand the economy but ignores the economic causes of right-wing populism. However, it is important to show how economics addresses populism, given the rise of populist leaders like Trump in the US, Modi in India, and Orban in Hungary.

The objective in this paper is to delineate the salient themes in the economics of populism to support a teaching plan on the topic. To this end, the paper is structured as follows. Section 2 provides a literature review to list the main ideas in the economics of populism from the Komlos (2023) textbook and recently published articles. It also draws from the economics of hate, as populism leads a dominant in-group to target a minority out-group. Section 3 sustains the same approach through recently published books, both academic and popular. The popular books by noted academics, Jason Stanley and Yuval Noah Harari, provide content beyond economics. Section 4 provides a teaching plan at the

introductory and elective levels, based on the list of key ideas from the previous two sections and introduces video clips to pique student interest. Section 5 provides concluding remarks.

2. Literature Review

This review is based on chapter 15 of Komlos (2023), papers on Trumpism and insurrectionists by Komlos (2017; 2018; 2024a), a short paper by Rodrik (2018), a paper based on demand and supply by Benczes and Szabo (2023), an AER paper by Funke et al. (2023), a comprehensive literature review by Guriev and Papaioannou (2022), and an older QJE paper on the political economy of hate by Glaeser (2005).

In Chapter 15, Komlos (2023) states that “equitable distribution of income is a pre-requisite of social and political stability” (p. 299). He argues that the rise of populism in the US can be explained through the backdrop of Reagonomics, globalization, financial crisis, and the IT revolution. Specifically, he notes that tax cuts under Reagan, deregulation of the financial sector and globalization under Clinton, and bail outs of the banks under Obama systemically contributed towards inequality and upward redistribution of wealth. This allowed Trump as a populist leader to tap into the rage of the lower middle-class people and deflect it towards immigrants and Muslims, even as he sustained tax cut policies for the corporations and the elite.

In his paper, Komlos (2024a) elaborates that like the KKK Klansmen and the Nazi Brownshirts, lower middle-class people drive US right-wing populism, as the rich are financially secure and the poor are focused on meeting their needs. The focus is primarily on loss of financial and social status and secondarily on racism, as the skills of the lower middle class depreciated with the IT revolution and jobs were outsourced with globalization. This continues the thesis in Komlos (2017; 2018), which explain the economic roots of Trumpism through the backdrop of stagnating wages, increasing debt, downward social mobility, and declining relative incomes. Overall, Komlos gives precedence to economic issues rather than cultural anxiety or racism in explaining the roots of right-wing populism in the US.

In a short paper, Rodrik (2018) argues that economists dislike populism, as it promotes policies that hurt the very people it aims to help. He states that right-wing (political) populism turns people against minorities and foreigners, whereas left-wing (economic) populism turns them against the financial elite. Additionally, political populism undermines democracy by trampling over minority rights and by co-opting countervailing institutions like independent judiciary and the free media. Finally, he argues that sometimes economic populism (ala New Deal) might be the only way to prevent political populism.

In a paper using a supply-demand framework, Benczes and Szabo (2023) state that the demand side of populism is explained by economic inequality and economic anxiety due to globalization, immigration, and financial crises (including banking crisis, currency crisis, or debt crisis). They highlight that while economists focus on economic hardship, political scientists focus on perceived unfairness. The supply side of populism is equated with expansionary fiscal and monetary policies and trade protectionism. This hurts people, who face lower growth, greater debt burden, and higher inflation. However, such left-wing populism is relevant to Latin America, whereas advanced economies face right-wing populism that emphasizes anti-immigration. Finally, the authors argue that voters re-elect populist leaders based on identity politics even at the expense of economic interests.

In their AER paper, Funke et al. (2023) state that populists create the dichotomy of the common people versus the corrupt elite but despite their claim to represent the people do not noticeably reduce economic inequality. They state that a populist leader is charismatic, oversimplifies issues, instigates polarization, exploits economic grievances, stokes nationalistic identity, and fuels conspiracy theories. They argue that left-wing populism in Latin America emphasizes distributional issues against the capitalist elite, whereas right-wing populism in Europe focuses on cultural and religious issues against ethnic and religious minorities. The former focuses on fiscal expansion, whereas the latter promotes business friendly policies, low taxes, and limited welfare programs. Additionally, right-wing populism undermines democracy by curtailing the judiciary and the free press and suppressing minority rights.

In their comprehensive literature review, Guriev and Papaioannou (2022) highlight the role of globalization, automation, financial crises, austerity, immigration, identity politics, and social media in explaining populism. The authors define populism generally through the separation of the pure people and the corrupt elite, authoritarian populism through the weakening of checks and balances, attacks on minorities, and xenophobic nationalism, and economic populism through fiscal expansion and redistribution at the expense of deficits, inflation, capital outflow, devaluations, and decline in real wages. Distinguishing between left-wing and right-wing populism, they state that while Chavez and Maduro of Venezuela and Morales of Bolivia focused on inequality and redistribution, Erdogan of Turkey and Modi of India rely on nationalism and attacks on religious and ethnic minorities.

The authors state that globalization (exposure to Chinese imports) and automation instigated deindustrialization of advanced economies, job polarization, stagnating wages, and inequality, which led to the rise of far-right populism. However, apart from economic factors, they emphasize non-monetary factors like identity politics and victimhood to explain why low-income voters may support right-wing politicians that support less redistribution. The authors state that populist leaders distort people's views by projecting immigrants as a threat to identity and culture, although contact with immigrants reduces xenophobia. In this regard, social media facilitates fake news, xenophobia, polarization, and echo chambers.

The authors argue that far-right populists stay in power by undermining democratic institutions like independent judiciary and the free press. Additionally, such populists normalize previously unacceptable behaviour. For instance, Trump's anti-Islam tweets have been positively correlated with hate crimes against Muslims. Overall, the authors define right-wing populism through anti-elitism, identity politics, nativism, and authoritarianism, and they suggest stronger social safety nets, tackling tax evasion by elites, curbing corporate market power, and citizen assemblies for democratic participation, as solutions.

In his paper on the political economy of hate, Glaeser (2005) argues that the supply of hate comes from politicians and the demand to listen from voters, and that hatred is based on repetition of false stories against an out-group and not the truth. He adds that economic interaction with the minority out-group helps combat hatred, policies that inhibit contact enhances hatred, and communication technology reduces the cost of spreading hate. Moreover, hatred arises between groups that closely resemble each other and that people who inflict massacres see themselves as victims, as they think others belittle them. He states that hate is based on generalizing a whole community based on the actions of a few. Glaeser notes that the rich are anti-redistribution, the poor are pro-redistribution, whereas the middle-income folks only reject redistribution when they hate the out-group. Finally, he states that when a large proportion of the population hates an out-group, it becomes difficult to combat hate without external pressure.

To recapitulate, the literature review yields the following key ideas in point form.

- Populism is based on the division of the common people versus the corrupt elite.
- Inclusionary populism emphasizes redistribution; exclusionary populism focuses on identity politics.
- Economic populism is explained through tax cuts, deregulation, globalization, financial crisis, whereas political populism is explained through nativism, immigration, identity politics, and social media.
- Right-wing populists undermine democracy by inhibiting the judiciary and the free press and stir hatred by projecting minority stereotypes.
- Economic populism is less dangerous than political populism, for while the former results in deficits, inflation, capital outflow, devaluations, and decline in real wages, the latter yields violence against minorities, undermines civil liberties, and weakens checks and balances.
- Lower middle class in advanced economies, who lost relative status due to globalization and automation, form the base of right-wing populism.
- The solutions to populism are citizen assemblies, stronger social safety nets, and addressing tax evasion and corporate market power.
- Far-right populists are elected when identity issues trump economic concerns.
- Left-wing populism targets the financial and capitalist elite, whereas right-wing populism targets ethnic and religious minorities.
- Sometimes economic populism can prevent political populism.
- Hatred is based on repetition of false stories not truth.
- Economic interaction and contact with the minority out-group help combat hatred.
- Hatred arises between groups that closely resemble each other.
- People who inflict massacres see themselves as victims.
- Hate is based on generalizing a whole community based on the actions of a few.

3. Book Reviews

Apart from journal articles, several academic books have been recently published that address the economics of populism and the economics of hate. The former includes Komlos (2024b) and Stankov (2021), whereas the latter includes Stone (2023) and an older book by Cameron (2009). Additionally, Iyer (2018) is reviewed to provide a case study of right-wing populism in India. There are also recently published popular books by noted academics that address the rise of right-wing populism, which is popularly described as fascism. These include Stanley (2018; 2024) and Harari (2018; 2024). A review of the salient ideas found in these books is as follows.

3.1 Academic Books

Komlos (2024b) notes that technological disruption, hyper-globalization, neoclassical economic policies, and the financial crisis set the stage for populism. He argues that populism is rooted in grievances based on inequality and defines it as an exclusionary anti-elitist political ideology. Populism undermines democracy by weakening countervailing institutions and targeting minorities, as populist leaders pit a dominant in-group against an out-group that is held responsible for grievances. He

highlights that Trump's populist support from the white working class remains despite tax cuts for the wealthy and poor handling of the pandemic. This is because he accentuates cultural issues like immigration, racism, white nationalism, and identity politics, and instigates fear and anger to project himself as a strongman.

However, Komlos retains his thesis that economic grievances precede identity politics. He argues that populism is primarily based on anger, anxiety, and grievances based on relative deprivation and downward social mobility with the backdrop of the IT revolution and hyper-globalization. He notes that the Reagan tax cuts allowed corporations and the elite to lobby for political influence, promote deregulation, and fund think tanks to promote laissez-faire ideology. This was concomitant with weakening of the unions and increase in household debt, as the middle class tried to keep up with the Joneses. Under Clinton, trade deficits exported jobs and low-skilled workers were displaced by cheap labour abroad. Such workers were unemployable in the expanding IT and finance sectors.

Komlos argues that the belief that the market system rewards hard work and talent allowed the winners from hyper-globalization and automation to look down upon the losers. It added to alienation, isolation, insecurity, meaninglessness, feelings of being ignored and ridiculed, anger, and the desire for revenge through a strongman leader. He adds that populism taps into the human need for belonging and status and that Trump provided that psychological need. He also notes that right-wing populists are submissive to authority but aggressive towards the out-group identified as the enemy. Finally, he identifies supply-side economics and neoliberal policies as responsible for creating inequality and setting the stage for right-wing populism and highlights promoting unions, tariffs, industrial policy, and job preservation as solutions. Overall, Komlos (2024b) is a continuation of the thesis established in Komlos (2018, 2023, 2024a).

In his book based on political economy, Stankov (2021) states that the necessary condition for populism is anti-elitism and the sufficient condition is anti-pluralism. He adds that populism is based on the conflict between the people and the elite, authoritarian populism is based on identity politics in Europe and the US in the context of inequality and immigration, redistributive populism exists in Latin America in the context of liberalization and financial crises, and whilst political scientists emphasize identity politics, economists focus on economic policies. Populist leaders undermine democracy by stacking institutions with loyalists and muzzling the free press. Moreover, people vote for populists with harmful economic policies if the harm inflicted on the out-group compensates for their identity loss. Thus, authoritarian populism arises when identity takes precedence over the economy.

Stankov states that low-skilled workers experience relative deprivation, and they will mobilize for the far-left where economic shocks dominate and for the far-right where identity shocks dominate. On immigration, he states that voters are more concerned about how it makes them feel (identity costs) rather than its actual economic impact. Stankov identifies inequality, migration, and austerity as the three principal factors behind populism. He adds that inequality feeds left-wing populism, migration feeds right-wing populism, and austerity affects both comparably. On left-wing populism, he states that inequality instigates fiscal expansion, which subsequently leads to inflation, current account deficits, currency crisis, and real wage cuts. Finally, in terms of solutions, he mentions assistance for losers of globalization, housing and education supported by a wealth tax, and universal basic income.

In his book based on behavioural economics, Stone (2023) argues that education based on civics and recognizing one's own blind spots helps reduce polarization. He adds that changing beliefs takes time but it's important to plant seeds and therefore it is important to have conversations and acquire news from pluralist sources. He argues that online platforms should direct users away from polarizing content

even if it reduces user engagement and lower revenues, as the cost of short-term loss in shareholder value will be outweighed by long-term company reputation. Finally, he mentions the contact hypothesis to argue that contact between people reduces polarization and hate.

In his book on the economics of hate, Cameron (2009) argues that when hate becomes part of the capital of the hater, it remains even when the populist authoritarian is removed or when the hater migrates. He states that the internet facilitates hate, as the cost of hate production is reduced when the element of personal sacrifice is diminished. He highlights *schadenfreude* where the hater experiences utility from the misfortune of the out-group. Applying economics jargon, he states that the principle of diminishing marginal utility does not apply to hate if the hater achieves utility from hate that is addictive. He adds that hate is like a club good without congestion effects, so that individual utility increases by sharing costs of hate and by sharing hate with club members that allows for externality benefits.

Cameron notes that revenge against an out-group is motivated by deeming it collectively responsible for historical wrongs against the in-group. He argues that emotional overload overwhelms reason, which allows people to violate moral constraints, and adds that authority voices, peer pressure, and propaganda amplify social neurosis and tip rational people towards inhumane acts. He notes that complying with authority provides confirmation of identity. Additionally, major wars have been related to ideology, nationalism, or religion and not economic issues. Cameron highlights that self-hate drives haters to project negative attributes onto others which they refuse to see within themselves. This projection deflects their shame and guilt to others. Moreover, they see the out-group as animals, which implies fewer rights and rationalizes their persecution.

He argues that provision of correct information does not resolve the hate against out-groups, as conspiracy theories based on myths are unfalsifiable. Moreover, hate can lie dormant for long periods before it flares up with mass expression. He states that haters can inflict abuse in a way that cannot be detected, shift blame to the victims and assert status superiority to humiliate their victims. However, abuse is moot if both parties are equally strong. Finally, he argues that routine conflict leads to desensitization so that people become numb to the suffering of others. Moreover, while parties to a conflict may forgive and forget, hate entrepreneurs of the future generation may choose to reignite historical grievances.

In her book centred on India, Iyer (2018) argues that religion-based violence has increased in India despite economic growth because of inequality. This is exploited by politicians who amplify historical grievances to instigate hate and maximize election votes. She notes the rise in right-wing populism, as Hindu hostility, militancy, and violence have increased against the Muslim community, which is viewed as a foreign enemy. Contrary to the lower-middle class in the US identified by Komlos, Iyer notes that Hindu fundamentalism is driven by both the middle-class and lower-middle class professionals that have experienced upward mobility. She adds that the middle-class covertly provides both funds and firearms for religious riots, and that elite groups with education and income support religious violence. Overall, she connects religious riots to both urban inequality and state elections. Finally, she highlights Hindus as the majority with a minority complex.

To recapitulate, apart from the list of ideas already highlighted in Section 2, the following provides a list of key ideas from the academic book reviews.

- Right-wing populism is based on identity politics in Europe and the US in the context of inequality and immigration, left-wing populism is based on redistribution in Latin America in the context of liberalization and financial crises.
- Voters elect populists with harmful economic policies if the harm inflicted on the out-group outweighs their identity loss.
- Left-wing populism arises where economic shocks dominate and right-wing populism arises where identity shocks dominate.
- Inequality feeds left-wing populism, whereas immigration feeds right-wing populism.
- Populism in the US is explained by tax cuts with Reagan, globalization and deregulation with Clinton, and bail outs with Obama, which set the stage for Trump.
- The solutions to populism include supporting unions, tariffs, industrial policy, job preservation, compensation to the losers of globalization, housing and education supported by a wealth tax, and universal basic income.
- Education based on civics helps reduce polarization.
- Online platforms facilitate polarizing content, which maximizes user engagement and revenues.
- *Schadenfreude* is when the hater experiences utility from the misfortune of the out-group.
- Revenge against an out-group is motivated by deeming it collectively responsible for historical grievances.
- Authority voices, peer pressure, and propaganda tip rational people towards inhumane acts.
- Self-hate drives haters to project negative attributes onto others which they refuse to see within themselves. They see out-group as animals, which rationalizes their persecution.
- Hate can lie dormant for long periods before it flares up with mass expression.
- Haters can inflict abuse in a way that cannot be detected, shift blame to the victims and assert status superiority to humiliate their victims.
- Routine conflict leads to desensitization so that people become numb to the suffering of others.
- Parties to a conflict may forgive and forget but hate entrepreneurs of the future generation may choose to reignite historical grievances.

3.2 Popular Books

Apart from academic books, several recently published popular books by noted academics outside economics (i.e., philosophy) address the topic of right-wing populism or fascism, as it is popularly described. These include Stanley (2018; 2024) and Harari (2018; 2024). A review of their salient ideas is as follows.

Stanley (2018) helps understand backsliding democracy and rising authoritarianism in countries like Hungary under Orban, India under Modi, and the US under Trump. He argues that fascism divides people along racial or religious lines, dehumanizes vulnerable minorities, glorifies a mythic past, perpetuates a sense of victimhood, and thrives on fake news. Moreover, it creates a dominant in-group “us” versus a targeted out-group “them” dichotomy. He argues that freedom of speech does not yield the truth in the marketplace of ideas, as fascism stokes fear and anger and promotes propaganda by repeating a few basic slogans, instead of reason-based discourse.

Stanley notes that once in power, fascists attack countervailing democratic institutions. For instance, they target professors who support Palestinian rights and label protesting students as angry mobs. He explains that the poor support policies detrimental to their own interests, as fascism makes suffering tolerable if the suffering of those we look down upon is greater than ours. He argues that fascism feeds off victimization. For instance, Serbian nationalists invoked the defeat at the hands of the Ottomans and the centuries of humiliation to justify the oppression of marginalized local Muslim populations.

Stanley notes that fascism instigates rape allegations against the out-group. For instance, Hindu nationalists instigate the “love jihad” narrative to project Muslim men as a threat to “Hindu masculinity”. Additionally, fascism minimizes the problematic acts of the in-group as mistakes but exaggerates those of the out-group as criminal. Finally, he shows that fascists create conditions that manufacture stereotypes of the out-group, which subsequently allows them to legitimize their inhumane treatment. For instance, Myanmar subjected the Rohingya Muslims to constant harassment, which created negative stereotypes and subsequently allowed for the rationalization of ethnic cleansing.

Stanley (2024) argues that fascism emphasizes national greatness, vilifies the left, and shifts the focus from poverty and inequality towards scapegoating a minority. He argues that fascism undermines the education system by indoctrinating students and erasing diversity of perspectives. He notes that right-wing activists hypocritically condemn universities for restricting free speech (with which they agree) and for allowing too much free speech (with which they disagree). Moreover, while education based on critical race theory, gender studies, and labour theory leads towards civic compassion, fascist politics suppresses their teaching.

Stanley describes Hindu nationalism as a violent supremacist movement based on religion, which marginalizes Muslims. He adds that students protesting anti-Muslims laws in India were subjected to severe police treatment and universities were labelled as anti-nationals for defending equal rights for Indian Muslims. This is like the US, where right wing propaganda tarnished anti-war protests in universities by professors and students. Overall, he shows that fascism undermines education, links universities with Marxism or anti-nationalism, and bans teaching that engenders civic compassion.

Harari (2018) argues that people are susceptible to groupthink and that providing facts backfires, as people don't like to feel stupid. Alluding to *Mein Kampf*, he notes that propaganda is based on the repetition of a few key points. He adds that power is based on spreading fictions, which provide people with an identity and higher purpose. For instance, Hindu nationalists argue that airplanes, nuclear weapons, and missiles were invented by ancient Hindu sages, and elements of the Jewish orthodoxy believe that that Jews are intrinsically superior and even invoke genocide as a religious duty.

Harari notes that fascists manufacture crises to prolong their rule. For instance, the Japanese army staged a false flag operation to justify its invasion of China. Additionally, he argues that education must emphasize critical thinking, as people can hold contradictory beliefs. For instance, a Hindu may mistreat his elderly parents but believe himself pious for supporting the destruction of the Babri Mosque, or a Buddhist monk in Myanmar may preach compassion for a mosquito but justify anti-Muslim bigotry. Thus, Harari highlights the need for critical thinking on inconsistent beliefs that allow one to inflict oppression whilst feeling good about oneself.

Harari (2024) argues that the solution to misinformation is not free speech, as information overload can crowd out the truth. He adds that repeatedly telling a fake memory results in people believing it. He states that truth does not resolve political disagreements, and instead fictional stories hold people together. Harari rejects the Marxist view that wars are fought for economic interests instead of religion

or nationalism. He explains that Nazis came to power when people believed in their harmful narrative given the backdrop of the economic crisis.

Harari argues that elections do not guarantee democracy, as it is not the same as majority dictatorship. Populist leaders maintain elections but undermine countervailing institutions, as they pack the judiciary with loyalists, control universities, and shut down independent media. They smear opposing leaders, journalists, and academics as anti-nationals, jail them, or fire them from their jobs. He adds that populist leaders blame all problems on foreign enemies and internal traitors.

Harari blames algorithms for the ethnic cleansing of the Rohingyas, as they actively make decisions on spreading hateful content to maximize user engagement. He also notes that surveillance technologies are used with draconian laws and military presence in the Occupied Palestinian Territories, Xinjiang, and Kashmir. Overall, he argues that free speech does not result in the truth, repetition of propaganda can perpetuate myths, populists in power undermine democracy by attacking countervailing institutions, and algorithms can inflict oppression. His key solution is robust checks and balances, transparency, and accountability in a democracy.

To recapitulate, the following provides a list of key ideas from the popular books by Jason Stanley and Yuval Noah Harari. For brevity, ideas already highlighted before are not listed.

- Freedom of speech does not yield the truth, as fascism promotes propaganda by repeating a few basic slogans.
- Fascism creates conditions that manufacture stereotypes of the out-group, which subsequently rationalizes their inhumane treatment.
- Fascism shifts the focus from poverty and inequality towards scapegoating a minority.
- Right-wing activists hypocritically condemn universities for restricting free speech (with which they agree) and for allowing too much free speech (with which they disagree).
- Power is based on spreading fictions on past glory, which provide people with identity and higher purpose.
- Critical thinking is important, as individuals can hold inconsistent beliefs that allow one to inflict oppression whilst feeling good about oneself.
- Populist leaders blame all problems on foreign enemies and internal traitors.
- Solution for populism is robust checks and balances, transparency, and accountability.

4. Teaching Plan

The literature and book reviews in Sections 2 and 3 yield a list of 39 key points from the economics of populism and the economics of hate and from academic and popular works in economics, political economy, and philosophy. Instructors can draw from this diverse list of salient ideas and emphasize some ideas accordingly at the introductory and elective levels of economics education. A sample teaching plan at the introductory and elective levels and quite briefly at the advanced level is as follows.

4.1 Introductory Level

Instructors must cover a set list of topics at the introductory, principles, or ECON 101 level. Though, they often have some room to consider topics like inequality, automation, climate change, and

populism. These topics can be briefly introduced in a 50-minute class by suppressing technical details in other topics. However, to do so, instructors will have to take the lead by introducing a few key points from the list above and to avoid information overload. The topic of populism can be seamlessly introduced in the discussion on unemployment.

As an activity to pique student interest, they can parse the lyrics of a 3:25 minute Disney video clip from *Beauty and the Beast*, specifically, the Mob Song where Gaston rouses people to kill the Beast. This clip allows an opportunity to discuss how populist leaders (Gaston) stoke fear and anger against an out-group (the Beast), claim to be the sole representative of the people, and undermine diversity of opinions (quelling Belle). It helps show that people are swayed by fictional stories rather than facts, emotional overload overwhelms reason, and that groupthink takes over (fifty Frenchmen can't be wrong).

Figure 1: The Mob Song – Beauty and the Beast (1991)



Video Clip: <https://www.youtube.com/watch?v=0ypxAKDMiFA>

Select and emphasized parts of the text of The Mob Song are as follows.

Gaston: The Beast will make off with your children! ...

Gaston: So it's time to take some action, boys

It's time to follow me! ...

Belle: No! I won't let you do this!

Gaston: **If you're not with us, you're against us. ...**

Mob: **We're counting on Gaston to lead the way! ...**

We don't like

What we don't understand

In fact **it scares us ...**

Save your children and your wives ...

We'll kill the Beast! ...

Here we come, we're fifty strong

And **fifty Frenchmen can't be wrong**

Apart from the activity of parsing the lyrics of The Mob Song, instructors can emphasize the key ideas delineated in the lists above based on the following sample questions and suggested outline of answers.

- What is the difference between economic populism and political populism?
The former is based on redistribution in Latin America, the latter on identity politics in Europe.
- Can you identify the in-group and the out-group in Europe? In India?
White nationalists versus immigrants; Hindu nationalists versus Muslims.
- How do populist leaders undermine democracy?
By stacking judiciary with loyalists and controlling the free press and universities.
- How do demand and supply explain populism?
Supply of populism is from political entrepreneurs; demand is from voters who imbibe hate messages.
- Who do populists blame for problems?
Foreigners and minorities.

Should instructors decide to assign readings, they can assign chapter 15 of Komlos (2023) titled “Economists’ Mistakes Lead to Right-Wing Populism and an Insurrection”. For extra reading, the four-page short paper by Rodrik (2018) titled “Is Populism Necessarily Bad Economics?” is appropriate. At this level, the focus is on brevity and maintaining student interest. Detailed discussions are best left for elective and advanced levels.

4.2 Elective Level

At the elective level, instructors can afford to go into more detail as they would get a more serious student cohort. In this case, instructors can cover the list of 39 ideas delineated above more comprehensively, assign popular books listed above for students to present, and facilitate class discussions. As an activity, one such discussion can be based on the contrast between chapter 1 of Komlos (2024b) and chapter 2 of Iyer (2018), where the former explains populism primarily through economic reasons and driven by the lower-middle class in the US, whereas the latter explains it through identity issues of an upwardly mobile class in India. The focus on India allows to highlight exclusionary nationalism outside the Trumpism phenomenon and as such provides an important case study for an elective topics class in economics.

The academic texts by Komlos (2024b) and Iyer (2018) can be complemented by a 30-minute video by YouTube educator and content creator, Dhruv Rathee, whose views have surpassed 21 million. This video can be shown for 6-minutes from the 10:40 – 15:30 mark to showcase the 4 stages of indoctrination under authoritarian populism. Rathee showcases the rise of right-wing populism in India under Modi and provides a backdrop contrast with the rise of Hitler in Nazi Germany. He lists the four stages where populist leaders stoke national pride and past glory, amplify historical grievances, perpetuate a narrative of victimhood where the dominant in-group (Hindus) is made to hate a minority out-group (Muslims), and promote support for a charismatic cult leader who would paternalistically save the dominant in-group. This is achieved through social media messages, specifically WhatsApp in India.

Figure 2: How Millions of Indians were BRAINWASHED



Video Clip: <https://www.youtube.com/watch?v=9Gmp2BAB3VA>

This video clips helps facilitate discussions on how majoritarian Hindu nationalists, both in India and abroad, dehumanize Muslims as “madrassachaps”, “jihadis”, or “porkis”, and invoke historical grievances to justify fascist politics against minority Muslims through social and economic boycotts in housing¹ and marketplace transactions² and through religious riots and violence. As noted earlier, reducing humans to animals implies they have fewer rights.

Instructors can lead class activity based on discussions around the Komlos (2024b) and Iyer (2018) texts, the Dhruv Rathee video, and use the following sample questions and suggested outline of answers.

- Is populism driven by economic factors or identity issues?
Komlos (2024b) focuses on economic issues of the lower middle class as the primary driver of populism in the US. Iyer (2018) focuses on the upwardly mobile class as driving right-wing populism in India. This shows that context matters and multiple perspectives are important.
- How have neoliberal policies contributed to populism?
Komlos (2024b) identifies tax cuts, deregulation, and bail outs as contributors to inequality and subsequent populism.
- What are the 4 stages of populist indoctrination?
Based on Dhruv Rathee’s video, these include pride, historical grievances, perceived threat from a minority group, and a cult around a charismatic leader.
- What factors help explain populism?

¹ See for instance “No Homes for Muslims? Hate, Hindutva & Housing Discrimination in Uttar Pradesh”, The Quint, September 2, 2025, <https://www.youtube.com/watch?v=SBcx52eDSM>.

² See for instance: Raj, K. (2023) “Indian Muslims in Haryana face calls for economic boycott after violence”, Al Jazeera, August 12, <https://www.aljazeera.com/news/2023/8/12/muslims-in-haryana-face-calls-for-economic-boycott-after-violence-in-nuh>.

Globalization, automation, financial crises, austerity, immigration, identity politics, and social media.

- How are populism and hate curbed?

Contact with others; democratic accountability, checks and balances; critical thinking on inconsistent beliefs that allow one to inflict oppression whilst feeling good about oneself; citizen assemblies; unions; stronger social safety nets; housing and education supported by a wealth tax; universal basic income.

In terms of readings, the academic chapters by Komlos (2024b) and Iyer (2018) can be supplemented by the popular works of Pankaj Mishra. For instance, Mishra (2017) argues that many upper-caste Hindus idolize Israel, as for them Israel deals with Muslims in the only language they understand, i.e., force. Such Hindu nationalists view Muslims as the fifth column that would outbreed Hindus, even though Muslims are worse off than low-caste Hindus in education, health, and employment and are frequently exposed to bigoted policemen and disproportionate death in Hindu-Muslim riots.

At an advanced level, apart from the case study on India, the literature reviewed above can be assigned as part of the reading list. Specifically, the papers based on demand and supply analysis of populism and hate respectively by Benczes and Szabo (2023) and Glaeser (2005) and the comprehensive literature review by Guriev and Papaioannou (2022) stand out. Additionally, they can be directed to the 55-minute lecture by Komlos titled “The Economic History of the Rise of Trumpism”.

Figure 3: The Economic History of the Rise of Trumpism



Video Clip: <https://www.youtube.com/watch?v=8QYAXplyZTc>

5. Concluding Remarks

The objective in this paper was to list the salient ideas in the economics of populism to provide a lesson plan at the introductory and elective levels in economics. This was achieved through a literature review and book reviews in the economics of populism, the economics of hate, and the political economy of

both populism and hate. The salient ideas were listed for ease of access for instructors to help build their teaching plans. Activities based on parsing song lyrics and contrasting viewpoints were highlighted along with sample questions and suggested outline of answers. The overall idea is to provide a resource for instructors who can draw wholly or partially for their own pedagogical purposes in teaching the economics of populism.

References

- Benczes, I. and Szabo, K. (2023) "An Economic Understanding of Populism: A Conceptual Framework of the Demand and the Supply Side of Populism", *Political Studies Review*, 21(4): 680-696.
- Cameron, S. (2009) *The Economics of Hate*, Edward Elgar, Cheltenham, UK and MA, US.
- Funke, M., Schularick, M. and Trebesch, C. (2023) "Populist Leaders and the Economy", *American Economic Review*, 113 (12): 3249–88.
- Glaeser, E.L. (2005) "The Political Economy of Hatred", *The Quarterly Journal of Economics*, 120(1): 45-86.
- Guriev, S. and Papaioannou, E. (2022) "The Political Economy of Populism", *Journal of Economic Literature*, 60(3): 753-832.
- Harari, Y.N. (2018) *21 Lessons for the 21st Century*, Penguin Random House, Canada.
- Harari, Y.N. (2024) *Nexus*, Penguin Random House, Canada.
- Iyer, S. (2018) *The Economics of Religion in India*, Belknap Press, Cambridge, MA.
- Komlos, J. (2017) "The Triumph of Trumpism," *Journal of Contextual Economics*, 137(4): 421-440.
- Komlos, J. (2018) "The Economic Roots of the Rise of Trumpism", CESifo Working Paper, No. 6868, Center for Economic Studies and ifo Institute (CESifo), Munich.
- Komlos, J. (2023) *Foundations of Real-World Economics: What every Economics student needs to know*, 3rd ed. Routledge, London and New York.
- Komlos, J. (2024a) "Estimating the Socio-Economic Status of the U.S. Capitol Insurrectionists", *The B.E Journal of Economic Analysis and Policy*, 24(1): 285-300.
- Komlos, J. (Ed.) (2024b) *Neoliberal Economic Policy and the Rise of Right-Wing Populism*, Palgrave Macmillan, Cham, Switzerland.
- Mankiw, N.G., Kneebone, R.D., and McKenzie, K.J. (2024) *Principles of Microeconomics*, 9th Canadian ed., Cengage, Toronto.
- Mishra, P. (2017) "India and Israel: An Ideological Convergence" in *This is Not a Border*, edited by Soueif, A. and Hamilton, O.R., pp. 93-98, Bloomsbury, London and New York.
- Rodrik, D. (2018) "Is Populism Necessarily Bad Economics?" *AEA Papers and Proceedings*, 108: 196-199.
- Stankov, P. (2021) *The Political Economy of Populism*, Routledge, London and New York.
- Stanley, J. (2018) *How Fascism Works*, Random House, New York.
- Stanley, J. (2024) *Erasing History*, One Signal, New York.
- Stone, D.F. (2023) *Undue Hate: A Behavioral Economic Analysis of Hostile Polarization in US Politics and Beyond*, MIT Press, MA.
- Thonnessen, J. (2023) "Book Review: John Komlos, *Foundations of Real-World Economics: What every Economics student needs to know*", *Advances in Economics Education*, 2(2): 195-202.

Author contact: binjahangiri@macewan.ca

SUGGESTED CITATION:

Junaid B. Jahangir, "Teaching Economics of Populism", *real-world economics review*, issue no. 112, December 2025, pp. 86-100, <http://www.paecon.net/PAEReview/issue112/Jahangir112.pdf>

You may post and read comments on this paper at <http://rwer.wordpress.com/comments-on-rwer-issue-112/>

Strength and weakness of Germany's economy

Leon Podkaminer¹

[The National Bank of Poland]

Copyright: Leon Podkaminer, 2025

You may post comments on this paper at

<http://rwer.wordpress.com/comments-on-rwer-issue-no-112/>

Abstract

Germany's economic strength, reflected in its huge trade surpluses, has hinged on restrictive fiscal and wage policies, which have suppressed domestic demand. However, these policies have increasingly been backfiring, as its trading partners in the EU, induced to emulate the German policy model, have regained the ability to run trade surpluses. The present political change in Germany brings some hope, and a large fiscal stimulus package is on the agenda. But the idea of 'kick-starting' the economy by implementing a new version of Agenda 2010 lives on; if implemented, its consequences would be bad for Europe – and for Germany itself.

Symptoms of economic weakness in the German economy are multiplying. In 2024, Germany's GDP shrank by 0.5%, following a 0.9% contraction in 2023. But the anaemic growth of the German economy is not merely a feature of the last few years: it has been going on for quite some time – it has just become more pronounced in recent years. Over a longer period (1996-2024), Germany's average annual GDP growth was a mere 1.2%, compared to 1.6% for the rest of the euro area (hardly an impressive result there either). Evidently, in terms of its growth performance, Germany has long been the 'sick man of the euro area' (or rather, one of its sicker members).

The current weakness of the German economy is often attributed to structural factors, such as bureaucratic over-regulation of the economy (motivated among other things by environmental considerations), over-specialisation (automotive industry), misguided energy generation policies (abandonment of nuclear power plants), etc. More recently, the loss of supplies of cheap gas from Russia has often been mentioned. Some commentators also cite the impact of unfavourable demographic and employment trends. Finally, there is the issue of the increased expansion of highly competitive exports from China.

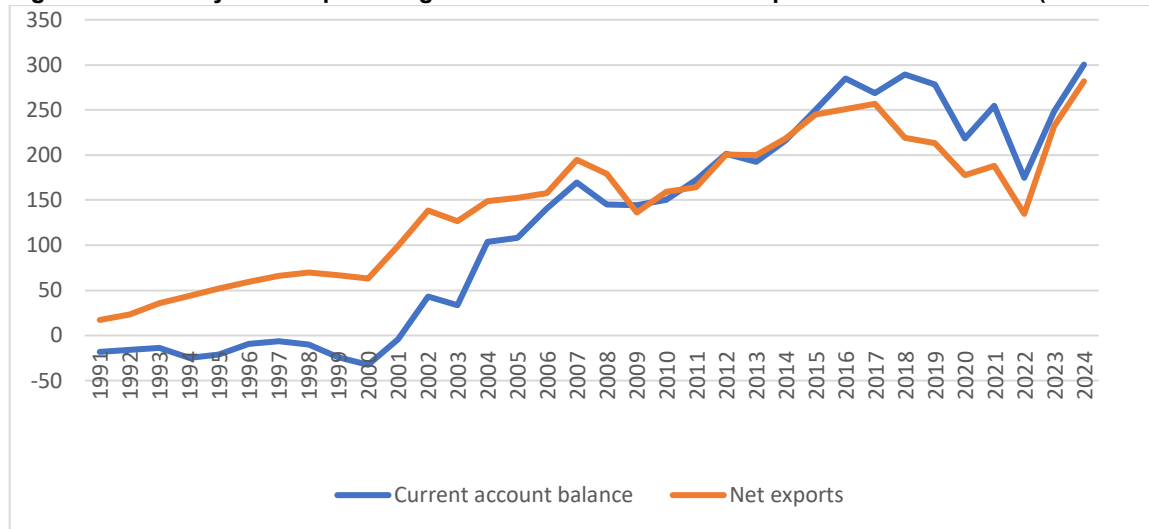
All of the above factors, goes the argument, are likely to have an adverse impact on the German economy; and taken together, they are supposed to justify the claim of a progressive loss of the country's competitiveness. However, this claim appears rather unjustified. Germany's economy remains remarkably competitive on the international market. And this is particularly true of its industrial sector.

Germany's strength: huge current account surpluses

¹ Thanks are due to Vasily Astrov for helpful comments on the earlier draft of this note.

None of the above-mentioned structural factors – more expensive energy, increased Asian competition, etc. – has diminished Germany’s ability to generate huge surpluses in goods trade and, consequently, in the current account (Figure 1). This demonstrates the remarkable competitiveness of Germany’s economy vis-à-vis the rest of the world.

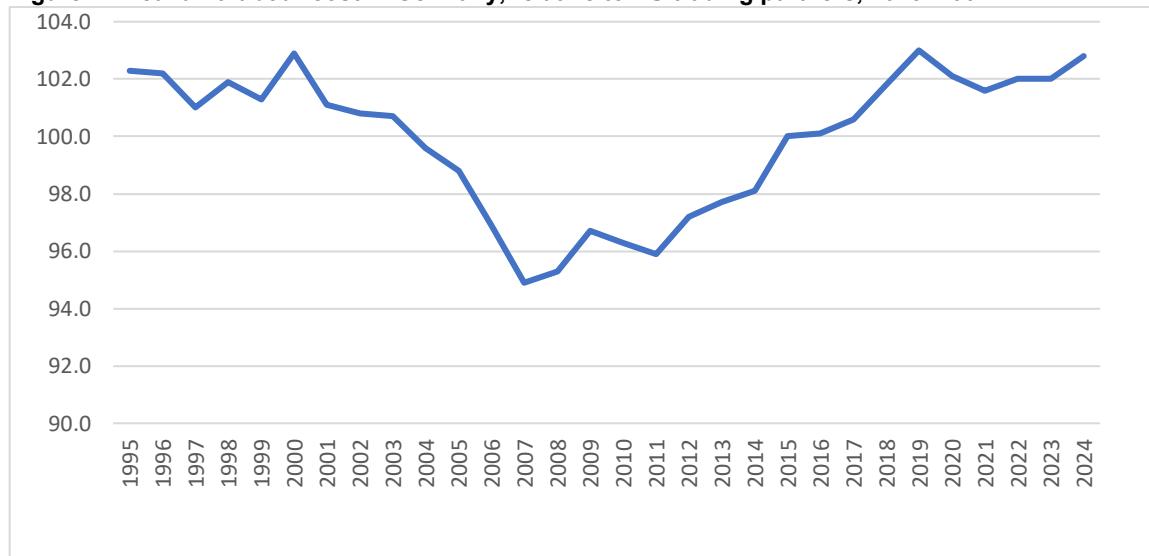
Figure 1 / Germany’s net exports of goods and current account surplus from 1991 to 2024 (billion euros)



Source: AMECO.

It is noteworthy that Germany recorded small current account deficits between 1991 and 2001. This probably reflected the extraordinary circumstances surrounding the integration (and reconstruction) of the Bundesländer inherited from the GDR. The transition from small deficits to rapidly growing surpluses occurred around 2003, when a whole package of reforms (the so-called Agenda 2010) started to be implemented. The reforms focused on making the labour market more flexible, the termination of many social privileges and the systemic reduction of the deficit in public finances. An important outcome (and goal) of Agenda 2010 was to reduce labour costs and improve price competitiveness vis-à-vis Germany’s main trading partners. This goal was achieved (see Figure 2).

Figure 2 / Real unit labour cost in Germany, relative to EU trading partners, 2015=100



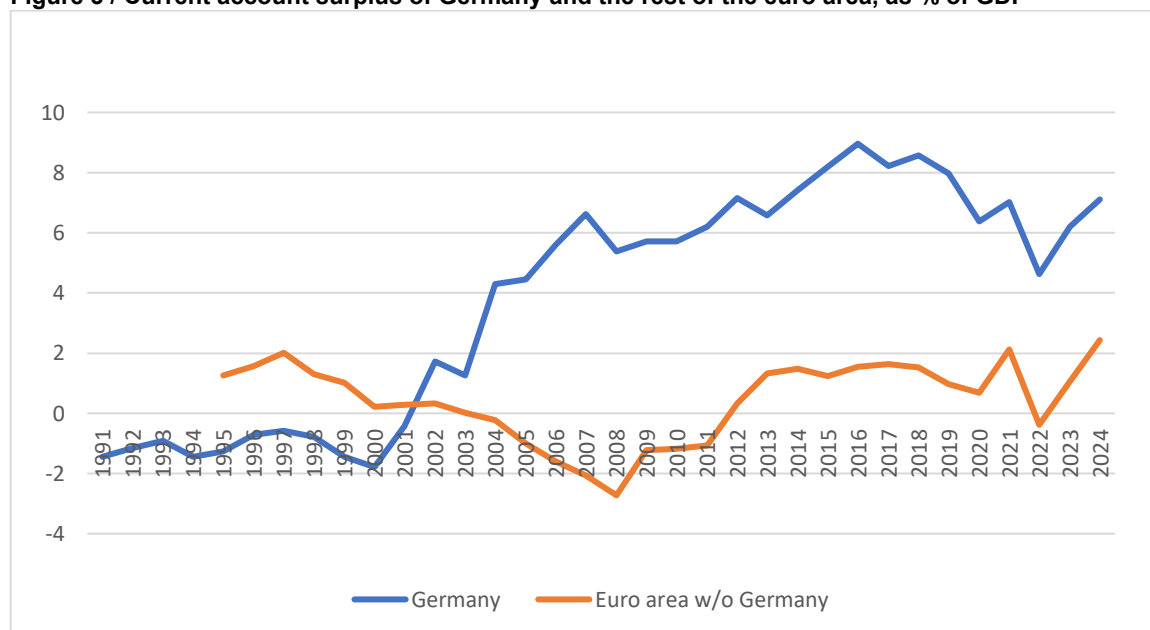
Source: AMECO.

The progressive reduction since 2003 in real unit labour costs, relative to the country's trading partners, has been achieved – among other things – on account of a decline in real wages in Germany itself. Between 2002 and 2007, the average real wage in Germany fell steadily, by an average of 0.3% a year. It is worth noting that it was only after 2019 that Germany's real unit labour cost, relative to its trading partners, returned to the level of the late 1990s. The improvement in Germany's wage competitiveness was clearly related to the rapidly growing expansion of exports (with still limited growth in imports) and the build-up of surpluses in the current account of the balance of payments.

An additional pro-export stimulus came with the launch of the common European currency. Before the introduction of the euro, the 'weaker' currencies of the area's member countries devalued quite freely and systematically against the German mark. This was especially true of the Italian lira, which fell steadily.² As a result, during the pre-euro era, the products of Germany's European trading partners successfully competed with German products, including in third-country markets. After the introduction of the euro, the devaluation of a currency to restore a country's competitiveness became impossible. This provided additional stimulus to Germany's exports – at the expense of other euro area economies, especially Italy.

This is reflected in the deterioration of the current account balance of the remainder of the euro area (Figure 3). Note that initially it generated surpluses – which, however, declined in parallel with the expansion of Germany's surpluses. It is worth remembering that the euro area also includes countries that are closely integrated economically with Germany (including in terms of wage-setting): Austria and the Netherlands. They, too, were running surpluses. By 2008, therefore, the aggregate current account deficits of the euro area without Germany, Austria and the Netherlands – especially its southern flank – were growing more than Figure 3 suggests.

Figure 3 / Current account surplus of Germany and the rest of the euro area, as % of GDP



Source: AMECO.

After the global financial and economic crisis of 2008-2009, the growth in Germany's current account surplus slowed. This can be attributed to recessionary crisis (and post-crisis) trends in the global and European economies. Another 'collapse' of exports and a significant reduction in the current account

² In 1974, the German mark was worth about 200 lira. By the late 1990s, it was around 1,000 lira.

surplus occurred during the COVID-19 pandemic (2022). However, even these 'slumps' were still accompanied by huge surpluses (e.g. nearly EUR 180 bn in 2022). Even in the midst of an acute global crisis, Germany's economy thus remained remarkably competitive against the rest of the world (and also its euro area trading partners).

Since 2011, the euro area countries have followed the path of Germany

Since 2003, the 'scissors' between Germany's current account surplus and the (combined) current account deficits of the rest of the euro area countries have been opening rapidly (Figure 3). Among the consequence of this trend were the growing foreign claims of German entities (including banks) and the growing foreign debts of economic entities (including banks) of the other euro area members. Until the outbreak of the global financial and economic crisis of 2008-2009, this situation presented no cause for concern – not least because of low interest rates and the widespread abundance of available capital (much of it speculative).

However, the outbreak of the global crisis (2008) and the subsequent debt crisis in the euro area (2009-2010) put an end to the option of easy borrowing by the economic entities of Germany's trading partners. This had consequences for both Germany and its partners. The latter found themselves faced with the need to work out trade (and current account) surpluses. Among other things, this meant adopting Germany's practices with regard to wage formation. In a recessionary environment, a process of so-called 'internal devaluation' has been taking place in Germany's partner countries since 2011. This has boiled down to a reduction in wage growth (or even an outright wage reduction). The process has led to a gradual decline in Germany's competitive advantage (see Figure 2) and the return of competition from its European trading partners (as well as a reduction in the scale of German current account surpluses, as can be seen in Figure 3).

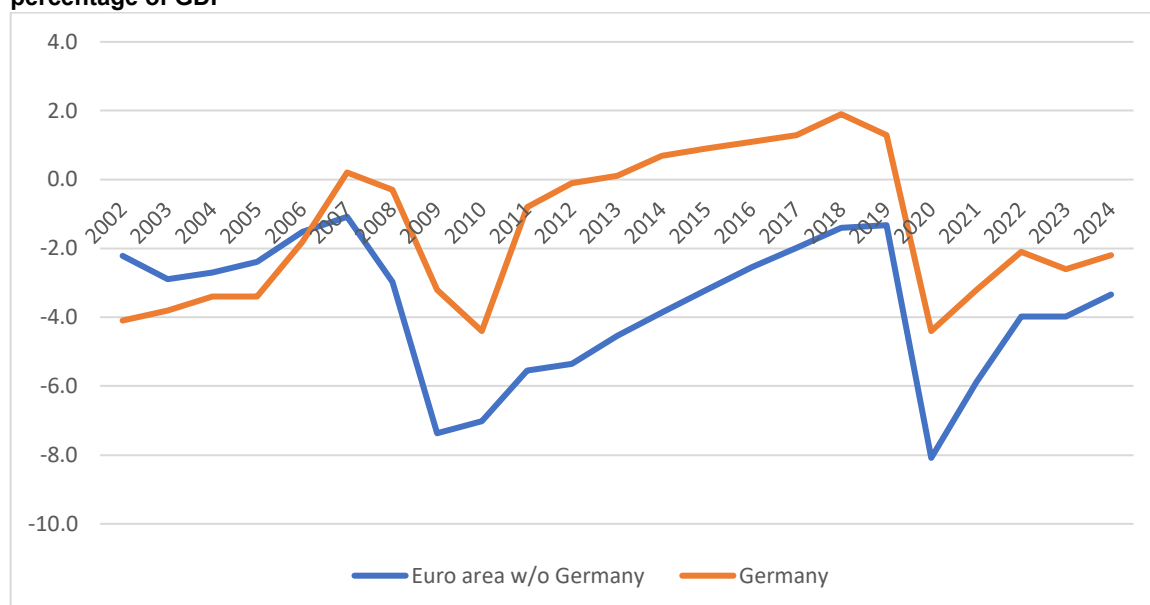
It is worth recalling that in 2009-2011 some of the excessive debts burdening the private sector were transformed into the public debt of individual countries. The partial nationalisation of bad private debts quite imperceptibly gave rise to the practice of blaming fiscal policy – i.e. the public sector – for the euro area's debt crisis. The fiscal policies of the most indebted countries (the so-called PIGS: Portugal, Italy, Greece and Spain, as well as Ireland) were placed under the scrutiny of the European Central Bank, the International Monetary Fund and the European Commission. Another Fiscal Pact (2011) followed, whose essence was to strengthen 'fiscal discipline' across Europe.

The imposition of policies minimising fiscal deficits was presumably intended to facilitate the workout of current account surpluses that would help the settlement of partner countries' foreign debts, primarily to Germany. Nor is it at all coincidental that the 'spirit' of this pact (and earlier treaties on the public finances of EU member states) corresponds to the views and practices of economic policy long dominant in Germany. Among these is the doctrine of 'black zero'. This is understood as a requirement that public finances should be balanced (or even show a slight surplus).

Germany's tendency to run a fiscal surplus is documented in Figure 4. As can be seen, there were sizable fiscal surpluses between 2012 and 2019. Only during the crisis periods (2008-2011 and after 2020) did Germany's public finances have to run a deficit – despite the best intentions of the German government, seeking to maintain fiscal discipline even in the face of deep economic slumps. The public finances of the other euro area countries (taken together) reacted much more sharply to the crises. Moreover, even in periods of relative prosperity, they were characterised by significant deficits. This sometimes gives rise to claims that those countries were at fault for not taking advantage of the good times to put their public finances in order. This ignores the fact that their prosperity may have been due

precisely to those fiscal deficits. Successful implementation of the programme to fix public finances may even have wiped out economic growth.

Figure 4 / Balance of public finances ('net lending/borrowing') of Germany and the rest of the euro area, percentage of GDP



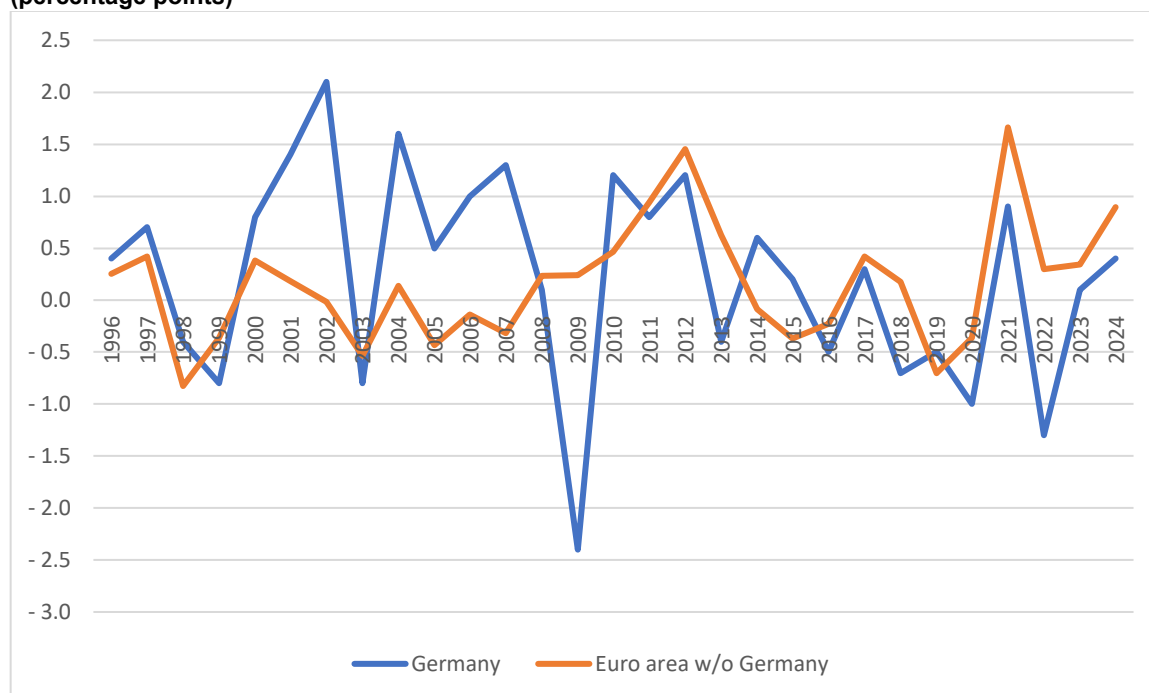
Source: AMECO.

The weakness of Germany's economy is a reflection of its strength

The 'virtues' of Germany's pursuit of a balanced budget (and generally the greater fiscal discipline there than elsewhere) and its supposedly 'economy-friendly', prudent wage policies have not been rewarded. Economic growth has been weaker in Germany than in the euro area generally. On average, Germany's GDP grew by 1.2% annually between 1996 and 2024, compared with about 1.6% for the rest of the euro area. It turns out that economic growth in Germany has been disproportionately the result of foreign trade (in goods and services). On average, foreign trade generated 0.2 percentage points of GDP growth throughout the period. Growth in domestic demand (i.e. primarily private consumption) generated 1 percentage point.

The contribution of domestic demand to GDP growth in the rest of the euro area was noticeably higher: 1.7 percentage points on average (while the contribution of foreign trade was negative, at -0.1 percentage points). Thus, foreign trade generated economic growth in the euro area to a much lesser extent than in Germany.

The differences in GDP growth rates and foreign trade contributions in the periods before and after the 2009 crisis are significant (see Figure 5). In the run-up to the 2009 crisis (1996-2008), foreign trade generated on average as much as 0.7 percentage points (pp) of Germany's 1.1% GDP growth, with only 0.4 pp coming from domestic demand (i.e. mainly consumption). During the same period, euro area GDP (excluding Germany) grew by an average of 2%, and the contribution of trade was negative (-0.6 pp). Domestic demand growth generated 2.6 pp of GDP growth.

Figure 5 / Contribution of changes in foreign trade (goods and services) to GDP growth rates (percentage points)

Source: AMECO.

Over the entire post-crisis period (2010-2024), Germany's annual GDP growth averaged 1.6%, compared to 2.6% in the rest of the euro area. The contribution of trade to growth in Germany was 0.1 pp versus 0.2 pp in the remainder of the euro area.

Evidently, the overall period 1996-2024 can be divided into two sub-periods that fundamentally differ as regards the role of trade in generating GDP growth. In the first sub-period (before 2009), foreign trade strongly supported growth in Germany and inhibited growth in the rest of the euro area. In the second sub-period (after 2009), foreign trade supported (albeit moderately) GDP growth in both Germany and the remainder of the euro area.

The above differences in the sources of GDP growth largely reflect differences in wage formation. This is particularly evident between 1999 and 2008. During that period, the effects of labour market reform, which resulted in wage restraint, were manifest in Germany. As a result, while the contribution to GDP of changes in domestic demand was clearly positive in Germany's trading partners during this period, it was low in Germany. After 2009, the contribution of foreign trade to Germany's GDP growth declined dramatically. Most likely, internal devaluations in other euro area countries led to a strengthening of their competitiveness, making it difficult for Germany to work out even higher trade surpluses (Figure 3). Of course, differences in GDP growth rates must also have been influenced by differences in the fiscal policies pursued (Figure 4).

Conclusions

Germany's economic strength, reflected in its huge trade surpluses, has been built on a restrictive fiscal policy, combined with a restrictive wage policy. The latter seems to have been accepted not only by the country's political elite, but also by the labour unions. This policy mix naturally leads to a

structural retardation of the economy (manifested, for example, in the underdevelopment of the service sector) and stagnation of consumption (and, as it turns out, of investment as well). As a result, Germany's economic growth has become dependent on expanding trade surpluses. The latter, however, depend on maintaining 'wage and fiscal discipline' – i.e. on stagnant domestic demand. And on foreign economic prosperity.

Working out trade surpluses is becoming increasingly difficult and risky. The global economy cannot indefinitely (and smoothly) absorb Germany's (and also China's) growing trade surpluses. Finally, forces are emerging to oppose the excessive imbalances in global trade. This is demonstrated, for example, by the electoral success of President Trump, a politician openly hostile to the mercantilist policies of the US's trading partners. Worse, the 'German disease' of subordinating the entire economy to the needs of the export front is proving contagious. The fiscal doctrine imposed on euro area countries and the need for so-called internal devaluation are a recipe for weak growth. Moreover, the German-EU doctrine of 'sound' public finances and the same doctrine of ensuring competitiveness at the expense of wages (and consumption) is backfiring on Germany: its EU partners already seem to be enjoying restored competitiveness – at Germany's expense.

The economic (and therefore political) future of the European Union will depend on the fate of its biggest economy, Germany. The present political change in that country brings some hope, as the new government is determined to substantially relax fiscal policy – by 2 pp of GDP over the next ten years, via increased spending on infrastructure and defence. However, the idea of 'kick-starting' the economy by implementing a new version of Agenda 2010 lives on.³ The consequences of a resolute continuation of past policies ('more of the same') would, in my opinion, be bad for Europe – and for Germany itself.

Author contact: Leon.Podkaminer@nbp.pl

SUGGESTED CITATION:

Leon Podkaminer, "Strength and Weakness of Germany's Economy", *real-world economics review*, issue no. 112, December 2025, pp. 101-107, <http://www.paecon.net/PAERreview/issue112/Podkaminer112.pdf>

You may post and read comments on this paper at <http://rwer.wordpress.com/comments-on-rwer-issue-112/>

³ Calls for 'more of the same' have already come from the influential Institut der Deutschen Wirtschaft. See e.g. 'Eine Agenda für die neue Legislaturperiode: Wettbewerbsfähigkeit und Transformation', Policy Paper 1/2025 and 'Steigende Sozialversicherungsbeiträge belasten die Wettbewerbsfähigkeit', Policy Paper 3/2025.

Gendered Exposure to Artificial Intelligence in Labor Markets: A Comparative Political Economy Analysis of Bulgaria, Romania, Germany, and India

Daniel Petrov

[Institute of Agricultural Economics, Sofia]

Copyright: Daniel Petrov, 2025
You may post comments on this paper at
<http://rwer.wordpress.com/comments-on-rwer-issue-no-112/>

Abstract

This paper investigates the gendered impact of artificial intelligence (AI) on labor markets through a comparative study of Bulgaria, Romania, Germany, and India. Utilizing AI Occupational Exposure (AIOE) and Complementarity Indices, the research examines how task automation and labor segmentation differentially affect women across income levels and national contexts. In Bulgaria, women are overrepresented in high-exposure, low-complementarity (HELCO) occupations, heightening their risk of technological displacement, especially in clerical and retail roles. Conversely, higher-income women demonstrate greater mobility toward high-complementarity roles. Comparisons reveal that Bulgaria and Romania share structural vulnerabilities due to similar institutional legacies, while Germany's dual vocational system mitigates AI risks. India presents a distinct case of technological exclusion rather than exposure. The findings underscore how institutional frameworks, educational systems, and labor market regulations shape gendered outcomes in AI transitions, reinforcing the relevance of segmented labor market theory and calling for targeted, inclusive labor policies.

Keywords: Artificial Intelligence, Gender Inequality, Labor Market Segmentation, Occupational Exposure, Comparative Political Economy

Introduction

Technological change has long played a decisive role in shaping gendered labor market dynamics, with mechanization, digitalization, and now algorithmic automation inducing structural shifts in employment that interact with prevailing patterns of occupational segregation, human capital accumulation, and social reproduction. As Goldin (1990) illustrates in her historical account of American women's labor participation, the diffusion of household appliances such as washing machines and vacuum cleaners significantly reduced the time burden of domestic labor, thereby increasing female labor supply elasticity. This was further compounded by innovations like the typewriter and the expansion of clerical work, which redefined the employment landscape in ways that made white-collar work more accessible to women (Costa, 2000). These historical shifts were not simply technological in nature but were embedded in institutional and cultural frameworks that governed access to education, control over fertility (Goldin and Katz, 2002), and the acceptability of women's labor force participation. The transition from an industrial to a post-industrial economy further

restructured occupational demand away from physical-intensive labor - typically dominated by men - toward service and knowledge-intensive work, where women increasingly found employment.

However, these transformations also entrenched gendered occupational segregation, with women disproportionately concentrated in roles characterized by routine cognitive tasks, which are now at heightened risk due to advances in artificial intelligence (AI) (Webb, 2020). The current wave of AI adoption represents a qualitatively different technological paradigm insofar as it automates tasks not through mechanization but through statistical learning and pattern recognition, potentially substituting workers in non-routine cognitive occupations that were previously considered automation-resistant (Autor, 2015). This raises critical questions regarding the gendered exposure to AI-driven task displacement, especially in countries with different stages of economic development, institutional configurations, and labor market structures. In the context of Bulgaria - a post-socialist, middle to low-income EU member state with relatively high female labor force participation but persistent occupational gender segregation - the intersection of AI adoption and gender warrants empirical scrutiny, particularly as it pertains to comparative insights with structurally similar (Romania), structurally divergent developed (Germany), and emerging economy (India) contexts. The core research question therefore interrogates the extent to which gender differences in AI exposure manifest in Bulgaria and how these patterns compare with those in Romania, Germany, and India. Specifically, this analysis posits three interrelated hypotheses grounded in political economy and labor economics. First, H1 posits that women in Bulgaria are more exposed to AI than men, due to their higher concentration in clerical, administrative, and service occupations with high AI task overlap (Felten, Raj, and Seamans, 2021). Second, H2 hypothesizes that high-income women are more likely to transition from high-exposure, low-complementarity (HELIC) to high-exposure, high-complementarity (HEHC) occupations, consistent with findings that occupational mobility in response to technological shocks is stratified by income, education, and skill (Cazzaniga et al., 2024). Third, H3 suggests that Bulgaria's AI exposure profile more closely resembles Romania's, due to similar labor market institutions, occupational structures, and education systems, and differs significantly from Germany and India, whose occupational exposure matrices are shaped respectively by highly developed knowledge economies and agrarian labor intensity (Hatzius et al., 2023). These hypotheses are not only grounded in existing empirical literature but are also theoretically anchored in segmented labor market theory (Doeringer and Piore, 1971), which emphasizes how structural rigidities and institutional complementarities shape workers' capacity to respond to technological change. To understand H1, we consider the composition of employment in Bulgaria across the International Standard Classification of Occupations (ISCO-08), cross-referenced with AI Occupational Exposure (AIOE) indices developed by Felten et al. (2021), which quantify the degree to which AI systems can replicate human abilities (e.g., reading comprehension, data entry, translation) in specific occupations. Bulgarian labor market data from the National Statistical Institute and the EU-LFS indicate that women are disproportionately represented in ISCO groups such as clerical support workers (Group 4), professionals in education and health (Group 2), and service and sales workers (Group 5), which exhibit medium to high AIOE scores. This concentration implies higher exposure to AI-driven task automation compared to male-dominated sectors such as skilled trades (Group 7) or machine operators (Group 8), which are more exposed to mechanization but less so to current forms of AI. Moreover, unlike in Germany, where AI exposure among women is partially offset by high complementarity in professional and managerial roles, Bulgarian women in HELIC roles often lack the contextual job features (e.g., responsibility for others, in-person interaction) that define HEHC roles in the complementarity index proposed by Pizzinelli et al. (2023). This lends empirical support to H1 and suggests a vulnerability that is consistent with findings from studies on other middle-income economies (Albanesi et al., 2023). H2 is supported by mobility data derived from longitudinal labor force surveys and reflects the broader literature on skill-biased technological change (SBTC), which posits that technology disproportionately benefits workers with high levels of education and adaptability (Autor, Levy, and Murnane, 2003).

In Bulgaria, while transition rates from HELC to HEHC roles remain limited overall, disaggregation by income decile and gender suggests that women in the upper income quintiles are more likely to enter professional roles with high AI complementarity, such as legal, medical, or managerial positions, echoing the gendered outcomes observed in the United Kingdom (Cortés et al., 2024). This upward mobility is facilitated by higher levels of tertiary education and soft skills, such as emotional intelligence and communication, which remain less substitutable by current AI technologies (Brynjolfsson and McAfee, 2014). Conversely, low-income women exhibit a greater tendency to exit the labor force or shift to low-exposure occupations with limited wage growth, reinforcing a dual labor market segmentation that may exacerbate existing inequalities. These findings align with historical patterns of technological disruption, whereby higher-skilled women have fared better than their male counterparts, while lower-skilled women have experienced higher rates of displacement (Albanesi and Kim, 2021). As for H3, a cross-country comparative analysis reveals that Bulgaria and Romania share a similar occupational AI exposure structure, characterized by high employment in routine cognitive sectors and a relatively narrow band of HEHC occupations. This similarity reflects not only shared post-socialist legacies and labor market policies but also parallels in educational attainment and occupational gender segregation. Germany, by contrast, displays a more diversified occupational structure, with a significant share of female employment in sectors with both high exposure and high complementarity, including health, STEM, and public administration, reflecting long-standing investments in vocational training and dual education systems (Beblavý et al., 2016). India's case stands apart due to its large informal sector and the high proportion of female employment in agriculture and low-skill services, resulting in a dominant share of low-exposure (LE) occupations and lower aggregate AIOE scores (Mehrotra and Parida, 2017). This divergence supports the hypothesis that Bulgaria's AI-gender exposure matrix is closer to that of Romania than to the structurally distinct cases of Germany and India.

These comparative insights are essential in understanding the heterogeneity of AI's labor market effects and challenge simplistic narratives of universal displacement. They highlight the importance of contextual variables - such as occupational structures, welfare state regimes, and labor market institutions - in mediating AI's impact on gender disparities in employment. Furthermore, the observed differences underscore the need to extend existing economic theories of automation, such as task-based models (Acemoglu and Restrepo, 2018), to account for intersectional and institutional dimensions that influence exposure and adaptability differentially across countries and genders. In sum, the intersection of gender and AI exposure in Bulgaria reflects a complex interplay of occupational concentration, skill levels, and structural rigidities that echo broader patterns observed in comparative political economy, reaffirming the relevance of institutionalist and labor segmentation approaches in understanding technological transitions in the labor market.

Methodology

The methodological strategy employed in this study operationalizes AI exposure in labor markets through a dual-index system that incorporates both the potential substitutability of human labor by artificial intelligence and the contextual resilience of occupational tasks to automation. This dual characterization is implemented through the construction of two distinct but complementary metrics: the AIOE index developed by Felten, Raj, and Seamans (2021), and the AI Complementarity Index proposed by Pizzinelli et al. (2023). The AIOE index is grounded in a formal task-based economic model which assumes that occupations consist of multiple task bundles, some of which are subject to automation if and only if the marginal cost of AI performance is lower than that of human labor (Acemoglu and Autor, 2011).

Formally, we let occupation $o \in O$ consist of a vector of tasks $T_o = \{t_1, t_2, \dots, t_n\}$. Each t_j has an associated automation feasibility score $\phi_j \in [0,1]$ denoting the extent to which AI can replicate the cognitive or manual component of the task. The AIOE index for occupation o , is then defined as the weighted sum of task-level automation probabilities:

$$AIOE_o = \sum_{j=1}^n w_{oj} \phi_j \quad (1)$$

Where w_{oj} denotes the weight or intensity of task t_j within occupation o , normalized such that $\sum_j w_{oj} = 1$. Task intensities are operationalized using the ONET database, which provides high-resolution empirical distributions of task prevalence across U.S. occupations and functions as a relational apparatus for capturing the internal heterogeneity of work by decomposing each job into discrete task bundles - cognitive, manual, social, and technical - whose weighted frequencies serve not merely as descriptive attributes but as proxies for structurally embedded divisions of labor shaped by gender, skill, and institutional histories; thus, when mapped onto ISCO-08 classifications using OECD-validated concordance protocols, ONET task data enables a theoretically robust and internationally transferrable framework that links occupation-level AI exposure to the underlying political economy of task decomposition, labor segmentation, and automation risk stratification across diverse labor market regimes (Espeland and Stevens, 2008; Eloundou et al., 2023; Katz, 2001).

The measure ϕ_j is based on the technical overlap between task t_j and the known capabilities of contemporary AI systems, such as natural language processing, pattern recognition, and symbolic reasoning, evaluated across ten benchmark AI domains (e.g., translation, reading comprehension, image generation). This framework assumes that the likelihood of AI substitution is monotonically increasing in ϕ_j and independent of institutional frictions. The AIOE index thus provides an ex ante estimate of occupational vulnerability by measuring potential task-level automation under the current technological frontier. However, as Pizzinelli et al. (2023) argue, AI exposure does not necessarily equate to displacement risk, because many high-exposure occupations are embedded in socio-technical systems that create barriers to automation. These include tasks requiring emotional labor, ethical judgment, physical presence, or relational interaction - dimensions not captured in ϕ_j but crucial for assessing economic resilience. To incorporate these constraints, we define a Complementarity Index C_o for each occupation o where:

$$C_o = \sum_{k=1}^m \gamma_k \chi_{ok} \quad (2)$$

where χ_{ok} represents the normalized score of occupational attribute k such as “face-to-face interaction” or “responsibility for others” - in occupation o as extracted from O*NET’s job context and job zone variables, and γ_k is a weighting parameter indicating the relative importance of attribute k in resisting automation. The attributes χ_{ok} are scaled such that $C_o \in [0,1]$ with higher values denoting stronger complementarities between human-specific features and occupational tasks. We then classify occupations into three categories using the bivariate distribution of $(AIOE_o, C_o)$. Let τ_E denote a threshold for high exposure and τ_C a threshold for high complementarity. An occupation o is categorized as follows:

$$\text{HEL}C \text{ (High exposure, low complementarity) if } AIOE_o \geq \tau_E \text{ and } C_o < \tau_C \quad (3)$$

$$\text{HEHC} \text{ (High exposure, high complementarity) if } AIOE_o \geq \tau_E \text{ and } C_o \geq \tau_C \quad (4)$$

$$\text{LE} \text{ (Low exposure) if } AIOE_o < \tau_E \quad (5)$$

This classification provides a stylized yet analytically robust framework for evaluating which occupations are susceptible to substitution versus augmentation. Occupations in the HELC group face high displacement risks, with expected reductions in both employment and wages, whereas HEHC occupations may benefit from AI-induced productivity gains and labor complementarity effects. The LE category comprises occupations with minimal AI exposure due to physicality, low information content, or task heterogeneity. This tripartite framework builds on the occupational transformation literature and aligns with empirical evidence on the polarization effects of technological change (Autor and Dorn, 2013; Acemoglu and Restrepo, 2018). To operationalize this classification across international contexts, we map O*NET-based occupational scores to the International Standard Classification of Occupations (ISCO-08) at the 2-digit level. This mapping uses a SOC-ISCO crosswalk validated by the OECD (2023) and adjusted for task content differences through concordance methods developed by the World Bank and ILO. Though originally calibrated on U.S. occupational data, empirical validations suggest strong predictive power across OECD and non-OECD contexts (Eloundou et al., 2023). The use of 2-digit ISCO codes balances parsimony and granularity, ensuring sufficient statistical power while preserving meaningful occupational heterogeneity. The HELC, HEHC, and LE groups are thus constructed for each country using the interpolated AIOE and complementarity scores, allowing cross-country comparability despite institutional differences in job design.

The empirical foundation of this study is constructed from nationally representative labor force microdata, harmonized across countries and years to facilitate robust comparative analyses. For Bulgaria, the primary dataset is the Labor Force Survey (LFS) administered by the National Statistical Institute (NSI), covering the period from 2020 to 2023. The LFS provides quarterly panel data with rotation groups that allow tracking individual respondents across multiple survey waves, thus enabling the construction of pseudo-panels for occupational mobility analysis. Key variables extracted include gender, age, employment status (including full-time, part-time, and self-employment), ISCO-08 occupational codes, educational attainment (classified using ISCED-11), monthly labor income (reported in BGN), and regional identifiers (NUTS 3). To supplement income data and enhance distributional precision, we incorporate the Survey on Income and Living Conditions (SILC), which includes equalized household income and expenditure items. Romania and Germany are included as structural comparators, with data sourced from the European Union Labour Force Survey (EU-LFS). The EU-LFS ensures methodological consistency across member states through standardized questionnaires, stratified random sampling, and Eurostat's harmonized coding protocols. For each country-year, we restrict the sample to the working-age population (16–64) and include only individuals employed in the reference week. Key variables harmonized across countries include gender, ISCO-08 occupation, ISCED education level, gross income (where available), sector of employment (NACE Rev. 2), and employment formality indicators. For India, the dataset is the Periodic Labour Force Survey (PLFS), accessed via the Integrated Public Use Microdata Series (IPUMS). The PLFS is administered by the National Statistical Office of India and provides nationally representative cross-sectional data on employment, self-employment, and unemployment. While PLFS does not directly report ISCO-08 codes, we implement a mapping protocol based on job title translations and the ILO's ISCO-08 concordance with India's National Classification of Occupations (NCO-2004). To enhance classification accuracy, we exclude ambiguous or mixed-category occupations and restrict the analysis to the formal labor market and non-agricultural wage workers, where occupational coding is more reliable. In all datasets, income is adjusted for purchasing power parity (PPP) using World Bank conversion factors, and wage deciles are computed separately for each country-year using the empirical cumulative distribution function. Education is treated categorically but also operationalized as years of schooling in sensitivity analyses. We denote the individual-level AI exposure category: $E_i \in \{\text{HELC}, \text{HEHC}, \text{LE}\}$, determined by the occupational mapping of individual i 's ISCO-08 code. For descriptive analysis, we compute the distribution:

$$P_{g,c}^E = \frac{1}{N_{g,c}} \sum_{i \in G_g \cap C_c} 1(E_e = E) \quad (6)$$

where $P_{g,c}^E$ is the proportion of individuals of gender g in country c working in occupations classified as category E , G_g is the gender group C_c is the country-specific sample, and $1(\cdot)$ is the indicator function. This allows for a full gender-disaggregated cross-country matrix of AI exposure categories. To explore exposure heterogeneity across the income distribution, we calculate:

$$P_{d,g,c}^E = \frac{1}{N_{d,g,c}} \sum_{i \in D_d \cap G_g \cap C_c} 1(E_e = E) \quad (7)$$

where D_d denotes the income decile group. For modeling occupational mobility (for countries with panel data such as Bulgaria and Romania), we estimate transition probabilities using a first-order Markov process. Define the state space $S = \{\text{HELC}, \text{HEHC}, \text{LE}, \text{U}, \text{NLF}\}$, where U denotes unemployment and NLF denotes exit from the labor force. The one-period transition matrix Π is estimated as:

$$\pi_{ab} = \frac{\sum_i 1(E_i^t = a, E_i^{t+1} = b)}{\sum_i 1(E_i^t = a)} \quad (8)$$

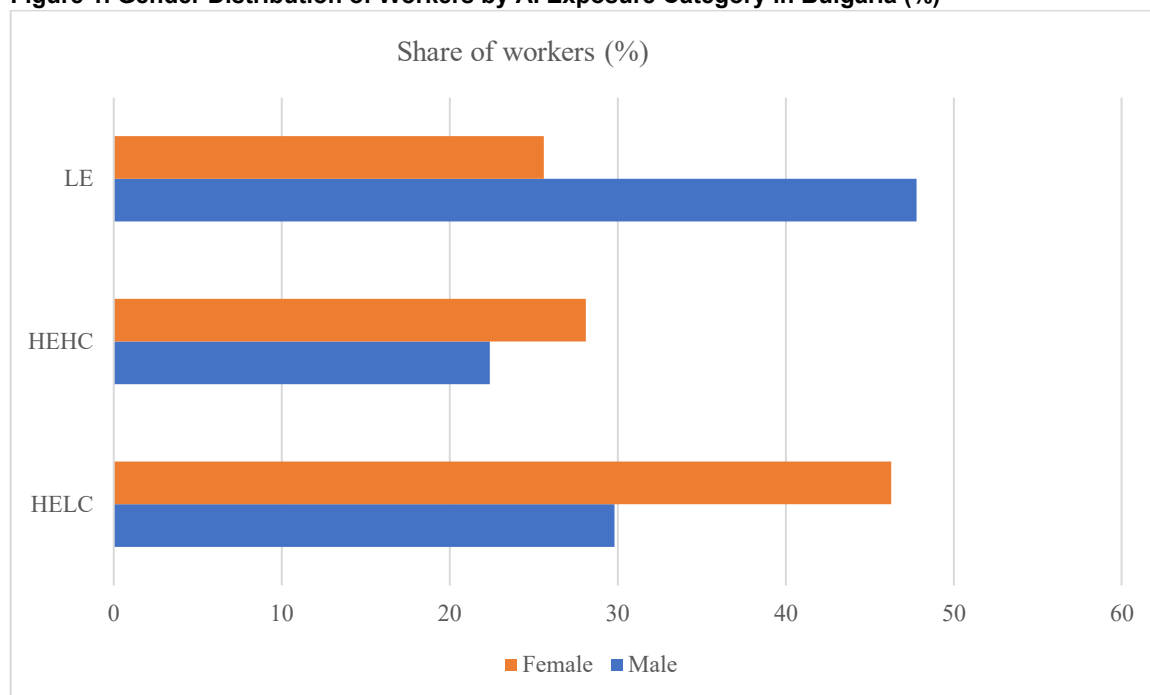
for all $a, b \in S$ where $t + 1$ denote consecutive quarters. These transition probabilities are computed separately by gender and income quintile, permitting analysis of dynamic inequality in response to AI-related structural change. All estimations are weighted using survey design weights to ensure population representativeness. The theoretical and empirical rigor of this methodology enables an integrated analysis of both the static distributional consequences and the dynamic adjustment mechanisms related to AI exposure, gender, and labor market segmentation, contributing to the broader literature on skill-biased technological change, segmented labor markets, and comparative political economy.

Empirical Analysis

Descriptive Statistics

The first layer of analysis involves calculating the distribution of male and female workers across these three exposure categories. **Figure. 1** presents the percentage share of men and women in HELC, HEHC, and LE occupations in Bulgaria.

Figure 1. Gender Distribution of Workers by AI Exposure Category in Bulgaria (%)



Source: Author's own calculations.

The results are striking: 46.3 percent of employed women are in HELC occupations, while the figure for men is significantly lower at 29.8 percent. Conversely, 47.8 percent of men are in LE occupations, compared to just 25.6 percent of women. These figures immediately highlight a structural asymmetry in labor market exposure to AI along gender lines. The proportion of women in HEHC occupations is 28.1 percent, slightly higher than the 22.4 percent observed among men, indicating that some professional roles offer opportunities for women to benefit from AI augmentations. However, the overrepresentation of women in HELC roles implies a heightened vulnerability to displacement or devaluation as AI continues to encroach on routine cognitive work.

To understand how economic status interacts with AI exposure, we disaggregate this data further by income decile. **Table. 1** provides the breakdown of HELC, HEHC, and LE occupational shares across ten income deciles, separately for men and women. For women in the lowest three income deciles, HELC roles account for more than 55 percent of employment. These roles are predominantly in clerical support, low-wage education positions (such as teaching assistants), administrative secretarial work, and retail services - occupations that are simultaneously routine, poorly paid, and highly susceptible to AI automation. In contrast, men in the same deciles are more evenly distributed across LE and HELC roles, with a larger presence in skilled manual work, such as mechanics, machine operators, and building trades, which - while less exposed to AI - are also limited in future mobility.

Table 1. AI Exposure Categories by Income Decile and Gender in Bulgaria

Income Decile	Gender	HELC (%)	HEHC (%)	LE (%)	Dominant Occupation Types
1 (Lowest)	Female	58.5	16.4	25.1	Clerical support, cleaners, retail assistants
	Male	38.7	15.1	46.2	Construction laborers, drivers, machine operators
2	Female	56.9	17.6	25.5	Teaching aides, hotel clerks, food servers
	Male	36.5	17.2	46.3	Carpenters, building trades, transport workers
3	Female	55.2	18.7	26.1	Administrative secretaries, receptionists
	Male	34.8	18.9	46.3	Mechanics, metal workers, warehouse staff
4	Female	50.8	21.3	27.9	Cashiers, library assistants, social support roles

	Male	32.6	20.1	47.3	Electricians, operators, low-tier technicians
5	Female	47.2	23.6	29.2	Insurance clerks, school support staff
	Male	29.7	21.9	48.4	Skilled trades, small machinery technicians
6	Female	43.4	26.1	30.5	Mid-level educators, office supervisors
	Male	28.2	24.5	47.3	Installation technicians, workshop managers
7	Female	39.1	29.3	31.6	Senior teachers, community health workers
	Male	25.8	26.7	47.5	Quality controllers, transport supervisors
8	Female	34.5	33.8	31.7	Civil servants, legal clerks, lead nurses

	Male	21.3	30.6	48.1	Foremen, IT assistants, junior engineers
9	Female	30.2	36.7	33.1	Education professionals, government officials
	Male	19.5	35.8	44.7	Senior technicians, IT managers
10 (Highest)	Female	27.4	42	30.6	Physicians, lawyers, senior administrators
	Male	17.2	39.6	43.2	Engineers, senior executives, data scientists

Source: Author's own calculations.

In the top three income deciles (deciles 8–10), the pattern shifts. Among women, there is a gradual increase in HEHC participation, reaching a peak of 42 percent in decile 10. These HEHC occupations include managerial roles in the public sector, education professionals, legal specialists, and healthcare professionals—all roles that are exposed to AI in terms of task automation but maintain high complementarity through interpersonal interaction, discretion, and responsibility. However, men in the same high-income deciles are more likely to occupy managerial and STEM-related positions with high AI exposure and high complementarity, including IT professionals, engineers, and senior executives. Thus, while high-income women have access to AI-resilient careers, the range and technological intensity of these roles are more limited than those held by high-income men.

The occupational composition of exposure is further detailed in **Table 2**, which matches ISCO-08 major groups with their AI exposure categories and shows the gender distribution within each. Women are overrepresented in ISCO Group 4 (Clerical Support Workers) and Group 5 (Service and Sales Workers), both of which are overwhelmingly HELC. In contrast, ISCO Group 2 (Professionals) is more evenly split between HEHC and HELC, with women concentrated in teaching and social work and men more likely to be in technical or engineering professions. Group 1 (Managers) is largely HEHC and male-dominated, while Groups 7 (Craft and Related Trades) and 8 (Plant and Machine Operators) are LE-heavy and also skew male.

Table. 2 Occupational Groups by AI Exposure Category and Gender Distribution in Bulgaria. ISCO-08 Major Groups, Dominant Exposure Classification, and Gender Shares (%)

ISCO-08 Group	Occupational Group Title	Dominant AI Exposure Category	% Female	% Male	Gender Notes
1	Managers	HEHC	31.2	68.8	Male-dominated; mostly private sector executives and technical managers
2	Professionals	Mixed HEHC / HELC	54.6	45.4	Gender split varies: women in teaching, social work; men in STEM, legal professions
3	Technicians and Associate Professionals	HEHC	44.7	55.3	Balanced representation; technical roles lean male, administrative technical roles female
4	Clerical Support Workers	HELC	72.3	27.7	Strongly female; dominated by secretarial and office support roles
5	Service and Sales Workers	HELC	64.9	35.1	Overwhelmingly female in sales, care work, hospitality
6	Skilled Agricultural, Forestry, and Fishery Workers	LE	38.5	61.5	Mixed; subsistence farming roles across genders, more male in forestry

7	Craft and Related Trades Workers	LE	11.8	88.2	Heavily male-dominated; includes electricians, carpenters, metal workers
8	Plant and Machine Operators and Assemblers	LE	19.2	80.8	Largely male; women more present in packaging, textiles
9	Elementary Occupations	HELC	52.7	47.3	Balanced; includes cleaners, laborers, helpers in services and manufacturing
0	Armed Forces Occupations	LE	15.3	84.7	Male-dominated; small share of total labor force

Source: Author's own calculations

Finally, the availability of rotational panel data in the LFS allows us to explore short-term occupational transitions. We track individuals in HELC occupations at baseline and observe their occupational status in the subsequent quarter, disaggregated by gender and income decile. The data reveals that low-income women (deciles 1–3) are significantly more likely to move into unemployment or exit the labor force entirely than to transition into HEHC roles. In contrast, high-income women and men are more mobile: among women in the top decile, 21 percent moved from HELC to HEHC roles over a 12-month period, while the figure for men was approximately 24 percent. These trends are visualized in **Table 3**, a heatmap showing the transition probabilities by income decile, exposure group, and gender. It underscores a deeply stratified pattern of occupational mobility, shaped by income, education, and gender.

Table 3 Heatmap of Transition Probabilities from HELC Occupations by Income Decile and Gender

Income Decile	Gender	To HEHC (%)	To LE (%)	To Unemployed (%)	To NLF (%)
1	Female	5.2	17.6	14.4	24.7
	Male	7.4	21.1	12.1	18.2
2	Female	6.1	18.2	13.3	22.4
	Male	8.3	20.5	11.6	17.9
3	Female	7.9	19.6	12.2	20.1
	Male	10.1	19.3	10.2	16.4
...
10	Female	21	14.3	5.1	6.7

	Male	24.2	12.6	4.4	5.1
--	------	------	------	-----	-----

Source: Author's own calculations

Comparative Perspective

To contextualize the findings from Bulgaria, we now compare its gendered AI exposure structure to that of three other countries: Romania (a regional peer), Germany (a developed Western European country), and India (a major emerging economy). The aim of this comparative analysis is to highlight both structural similarities and divergences that result from differing labor market institutions, occupational distributions, and technological integration across diverse economic contexts. Starting with Romania, the exposure pattern appears closely aligned with Bulgaria's. Using EU-LFS data and applying the same classification of AI exposure, we observe that Romanian women have similarly high representation in HELC occupations (approximately 45.1 percent), particularly in clerical, retail, and basic service jobs. The structural similarity is further supported by the countries' shared post-socialist institutional legacies, weak vocational education-to-employment pipelines, and relatively high levels of occupational segregation by gender. Romanian men, much like their Bulgarian counterparts, are more concentrated in LE occupations such as craft, construction, and machine operation. **Table 4** presents the AI exposure shares by gender for all four countries.

Table 4. Gendered AI Exposure Distribution Across Selected Countries
Share of employed individuals by AI exposure category (%)

Country	Gender	HELC (%)	HEHC (%)	LE (%)	Key Observations
Bulgaria	Female	46.3	28.1	25.6	High HELC concentration in clerical, admin, and retail roles
	Male	29.8	22.4	47.8	Strong presence in LE jobs (craft, manual trades)
Romania	Female	45.1	26.3	28.6	Similar pattern to Bulgaria; high exposure and low complementarity
	Male	31.2	21.5	47.3	Overrepresented in LE roles; echoing Bulgaria's structure
Germany	Female	30.5	35.2	34.3	More balanced; many women in HEHC (healthcare, education)

	Male	27.3	36.8	35.9	High HEHC concentration (STEM, management); lower HELC risk
India	Female	23.6	15.9	60.5	Majority in LE (agriculture, informal labor); low AI exposure overall
	Male	18.1	26.4	55.5	LE-heavy; some mobility into HEHC via IT and tech services

Source: Author's own calculations

In Germany, the distribution is more symmetric and occupationally diversified. German women are less concentrated in HELC jobs (around 30 percent) and more prevalent in HEHC roles (around 35 percent), particularly in healthcare, education, and public administration—sectors with high AI exposure but also strong complementarity due to interpersonal tasks and ethical responsibilities. German men, meanwhile, dominate HEHC roles in STEM fields and executive positions. This distribution reflects a more robust and inclusive vocational education system, which supports gender-balanced occupational development and provides smoother pathways into high-complementarity occupations (Beblavý et al., 2016; Thelen, 2014).

India, by contrast, presents a very different picture. The majority of women in the labor force are employed in low-skill, low-wage sectors - primarily agriculture, domestic work, and informal retail - that fall into the LE category. Only around 24 percent of women in India are in AI-exposed roles at all, with HELC and HEHC categories both underrepresented. While this might suggest a protective buffer against AI disruption, it more accurately reflects technological marginalization rather than resilience. Indian men have slightly higher representation in HEHC occupations due to participation in IT services and engineering, but the vast informal sector and limited access to advanced education curtail overall occupational upgrading. It clearly illustrates that women in Bulgaria and Romania are more exposed to AI in terms of substitution risk than their counterparts in Germany and India, albeit for different reasons: structural institutional deficiencies in Eastern Europe and sectoral exclusion in India.

This comparative perspective underscores that while AI exposure is a function of technology, its consequences are mediated by national occupational structures, gender norms, and educational systems. In Germany, institutional supports mitigate exposure risk and enable AI complementarity. In Bulgaria and Romania, structural rigidities channel women into high-risk roles with limited mobility. In India, exclusion from the formal economy dampens exposure but also suppresses economic opportunity. These findings align with comparative political economy theories that link labor market stratification to institutional variety (Iversen and Soskice, 2006; Estevez-Abe et al., 2001).

Discussion

The analytical interpretation of the empirical findings reveals a multilayered structure of gendered exposure to artificial intelligence in the labor market, shaped by institutional, technological, and occupational dynamics that are historically embedded and structurally reproduced. The

overconcentration of women in high-exposure, low-complementarity (HELC) occupations in Bulgaria - particularly in clerical, administrative, retail, and personal service roles - reflects not merely individual labor market choices but the long-term segmentation of the economy along gendered task lines. These occupations are characterized by high routine intensity and limited task discretion, making them particularly susceptible to substitution by algorithmic systems and generative AI. The same structural logic extends to Romania, where legacy institutions of post-socialist labor markets, weakly integrated vocational pipelines, and a persistent undervaluation of social reproduction work contribute to similar occupational clustering. In contrast, the German case highlights the importance of dual-track education systems and state-supported occupational mobility in reducing gender-based AI risk. Here, the higher presence of women in high-exposure, high-complementarity (HEHC) occupations - such as teaching, healthcare, and social work - suggests a reallocation toward domains where AI is less a threat than a productivity-enhancing tool, requiring interpersonal, ethical, and contextual judgment. These roles, while exposed to AI technologies, retain high levels of human input and are institutionally protected by professional standards, public sector employment, and welfare-state complementarity. India, as a counterpoint from the global South, demonstrates low absolute AI exposure across both genders, largely due to a labor force dominated by informal, low-productivity, and agrarian employment. The gendered pattern in India is marked less by automation vulnerability and more by technological exclusion: women's labor force participation is constrained not by AI exposure but by deep-seated structural barriers to entry into AI-relevant occupations altogether. This divergence highlights that AI exposure is not only a function of technology but of the social and institutional scaffolding in which labor markets are embedded. These national-level contrasts also reinforce the hypothesis that exposure patterns are deeply conditioned by education systems, sectoral composition, and labor market regulations. When interpreted through the lens of task-based economic theory, it becomes evident that HELC occupations comprise a set of narrowly defined, repetitive, and codifiable activities that are precisely those targeted by AI's most mature capabilities - language processing, data entry, transactional decision-making - functions once thought to be resilient due to their cognitive nature but now rendered replicable by general-purpose AI tools.

The regression analysis underscores that being female significantly increases the likelihood of employment in HELC categories, even after controlling for wage decile, sector, and education, confirming that occupational sorting is not neutral but reflects enduring patterns of gender stratification. The income gradient of exposure further sharpens this picture: low-income women face both higher risk of displacement and lower probabilities of transition to HEHC roles, while their high-income counterparts - though also exposed - are more likely to occupy resilient professional niches with career mobility and digital augmentation potential. This bifurcation within the female labor force itself reveals that income and education function as mediating variables of technological vulnerability. The transition data drawn from rotational panel structures offers critical insight into mobility constraints. For low-income women in HELC roles, the most likely transitions are into unemployment or out of the labor force, rather than into HEHC or low-exposure (LE) occupations. This suggests that reallocation is structurally blocked by credential gaps, care responsibilities, sectoral immobility, and weak active labor market policies. In contrast, high-income men exhibit the greatest likelihood of upward occupational transition—from HELC to HEHC or into advanced LE fields - benefiting from both technological complementarities and positional advantages within firms.

This mobility asymmetry implies that AI exposure is not just a technological event but a class-contingent and gender-mediated process. Furthermore, the sectoral composition of HELC roles - dominated by feminized industries such as retail, education support, hospitality, and routine public administration - reinforces the idea that entire segments of the labor market are institutionally configured to cluster women in roles that are simultaneously underpaid and technologically vulnerable. These patterns are not accidental but are the result of historical political-economic choices:

undervaluing care labor, constructing fragmented part-time employment, and limiting training access for women beyond reproductive-age career windows. Even within HEHC occupations, a gender divide persists in the type of technological intensity encountered. Men in high-income deciles are more likely to be in engineering, executive management, and IT - HEHC roles with high wage premia and strategic organizational importance - while women tend to cluster in social professions with limited upward wage elasticity despite their complementarity to AI. This differentiation implies that AI complementarity, while protective, is not universally empowering. Moreover, occupational upgrading among women is constrained by what could be termed vertical complementarity asymmetry: even within HEHC roles, the potential for digital augmentation and productivity-based rewards varies significantly by gender due to role type, hierarchical position, and organizational embeddedness. The comparative structure also suggests that institutional buffering mechanisms - such as collective bargaining, sectoral minimum wages, and regulated vocational transitions - play a crucial role in mitigating AI exposure disparities. Germany's stronger HEHC share across both genders is likely enabled by coordinated market institutions and long-standing skill formation systems, while Bulgaria and Romania's liberalized labor regimes and fragmented upskilling strategies hinder adaptive transitions. In India, by contrast, the discussion must move beyond exposure to encompass technological marginalization, as the absence of basic infrastructure, education access, and digital labor systems excludes large portions of the female workforce from even engaging with the AI economy. Hence, AI exposure in India is bifurcated between a thin upper layer of technologically integrated professionals and a broad base of non-participants structurally locked out of digital capitalism.

Policy Implications

The stratified exposure to artificial intelligence observed across gender, income, and occupational class in Bulgaria and its comparator countries underscores the necessity for targeted, institutional responses capable of mitigating technological displacement and facilitating equitable occupational transitions. First and foremost, the evidence that women - particularly in the lowest income deciles - are overrepresented in high-exposure, low-complementarity (HELC) occupations necessitates policy measures aimed at both short-term protection and long-term reallocation. Given that many HELC roles are concentrated in clerical, retail, and basic service sectors, policy should not assume that digitalization will organically lead to upskilling or labor mobility. Instead, strategic investment in publicly funded reskilling programs tailored to women in vulnerable sectors is essential. These programs should prioritize transferable digital and interpersonal skills linked to high-exposure, high-complementarity (HEHC) roles such as healthcare, education, legal administration, and public service management. Crucially, these interventions must be embedded within active labor market policies (ALMPs) that provide financial incentives, flexible formats (e.g., modular or hybrid delivery), and on-the-job training placements coordinated with employers in AI-resilient sectors.

Additionally, policy must address the structural barriers that impede transition from HELC to HEHC roles, especially for women in the middle and lower income deciles. These include constraints such as care responsibilities, sectoral immobility, low prior education, and gender biases in job matching algorithms and employer hiring practices. Governments should therefore integrate complementary care infrastructure - such as affordable childcare and eldercare services - into the design of upskilling policies, thereby enabling time-constrained female workers to participate. Furthermore, public employment services should be modernized to include AI-aware profiling tools that do not replicate existing gender biases, and should work in tandem with trade unions and employers' associations to facilitate sectoral mobility pathways for at-risk groups. This requires linking occupational exposure mapping to national qualification frameworks and ensuring the portability of credentials across sectors.

In parallel, wage protection mechanisms are essential to ensure that transitions into HEHC roles do not come at the cost of precarious working conditions. The finding that even high-income women are concentrated in HEHC roles with limited technological intensity and narrow wage premia highlights the need to accompany mobility policies with collective bargaining support, minimum wage enforcement in feminized sectors, and anti-segmentation regulation to prevent the downgrading of job quality as AI is adopted. In countries like Bulgaria and Romania, where labor markets are characterized by fragmented bargaining structures and weak vocational systems, institutional reinforcement is needed through stronger public–private coordination and sectoral skills councils that can plan for AI integration based on occupational risk assessments. For younger cohorts, gender-responsive vocational and tertiary education reform is essential to correct the long-term occupational sorting that places women on pathways to HELC roles. This includes increasing female participation in STEM fields, as well as ensuring that curricula in service-oriented disciplines integrate AI-relevant competencies such as digital literacy, algorithmic thinking, and ethical judgment. In the absence of such anticipatory policy, the next generation of women will remain structurally confined to occupational niches vulnerable to technological substitution.

Lastly, the international contrast with Germany and India points to broader development-oriented implications. In coordinated market economies, policies that embed skill formation in sectoral institutions - such as Germany's dual vocational training system - help buffer gender asymmetries in AI exposure. Conversely, in emerging economies like India, the policy challenge lies not in exposure but in exclusion from the formal, AI-integrated economy. Thus, any AI-resilience strategy must be context-specific, leveraging institutional strengths while actively correcting for labor market asymmetries. Cross-national policy dialogue and coordinated EU-level funding instruments should support countries with weaker institutional capacity to build equitable, technologically adaptive labor markets.

References

- Acemoglu, Daron, and David Autor. "Skills, Tasks and Technologies: Implications for Employment and Earnings." *Handbook of Labor Economics* 4, no. B (2011): 1043–1171.
- Acemoglu, Daron, and Pascual Restrepo. "Artificial Intelligence, Automation and Work." In *The Economics of Artificial Intelligence: An Agenda*, edited by Ajay Agrawal, Joshua Gans, and Avi Goldfarb, 197–236. Chicago: University of Chicago Press, 2018.
- Albanesi, Stefania, and Jiyeon Kim. "The Gender Gap in Labor Market Response to Automation." *American Economic Journal: Applied Economics* 13, no. 4 (2021): 1–31.
- Albanesi, Stefania, Victor Ríos-Rull, and Jiyeon Kim. "Technological Change and Labor Market Inequality: A Gender Perspective." *Journal of Economic Perspectives* 37, no. 1 (2023): 55–76.
- Autor, David H. "Why Are There Still So Many Jobs? The History and Future of Workplace Automation." *Journal of Economic Perspectives* 29, no. 3 (2015): 3–30.
- Autor, David H., and David Dorn. "The Growth of Low-Skill Service Jobs and the Polarization of the US Labor Market." *American Economic Review* 103, no. 5 (2013): 1553–1597.
- Autor, David H., Frank Levy, and Richard J. Murnane. "The Skill Content of Recent Technological Change: An Empirical Exploration." *Quarterly Journal of Economics* 118, no. 4 (2003): 1279–1333.
- Beblavý, Miroslav, Mariusz Jakubowski, and Ivana Mašidlová. "Public Employment Services and the Labour Market Integration of the Low-skilled in Europe." *CEPS Special Report* no. 138 (2016).
- Brynjolfsson, Erik, and Andrew McAfee. *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*. New York: W. W. Norton & Company, 2014.

- Cazzaniga, Andrea, Iva Valentinova Petrova, Richard Bluhm, and Lisa Dettling. "Technological Complementarity and Occupational Mobility in Europe." *Labour Economics* 85 (2024): 102419.
- Cortés, Patricia, José Tessada, and Jessica Pan. "Occupational Upgrading in the Wake of Automation: Evidence from the UK." *Industrial and Labor Relations Review* (forthcoming, 2024).
- Costa, Dora L. "From Mill Town to Board Room: The Rise of Women's Paid Labor." *Journal of Economic Perspectives* 14, no. 4 (2000): 101–122.
- Doeringer, Peter B., and Michael J. Piore. *Internal Labor Markets and Manpower Analysis*. Lexington, MA: Heath, 1971.
- Eloundou, Tyna, Sam Manning, Pamela Mishkin, and Daniel Rock. "Occupational Tasks and the Capabilities of Language Models." *arXiv preprint arXiv:2303.10130* (2023).
- Espeland, Wendy Nelson, and Mitchell L. Stevens. "A Sociology of Quantification." *European Journal of Sociology* 49, no. 3 (2008): 401–436.
- Estevez-Abe, Margarita, Torben Iversen, and David Soskice. "Social Protection and the Formation of Skills: A Reinterpretation of the Welfare State." *Politics & Society* 29, no. 2 (2001): 337–367.
- Felten, Edward, Manav Raj, and Robert Seamans. "Occupational Tasks and the Capabilities of AI." *Brookings Papers on Economic Activity* (2021).
- Goldin, Claudia. *Understanding the Gender Gap: An Economic History of American Women*. New York: Oxford University Press, 1990.
- Goldin, Claudia, and Lawrence F. Katz. "The Power of the Pill: Oral Contraceptives and Women's Career and Marriage Decisions." *Journal of Political Economy* 110, no. 4 (2002): 730–770.
- Hatzius, Jan, Joseph Briggs, Devesh Kodnani, and Ronnie Walker. "The Potentially Large Effects of Artificial Intelligence on Economic Growth." *Goldman Sachs Research Report* (2023).
- Iversen, Torben, and David Soskice. "Electoral Institutions and the Politics of Coalitions: Why Some Democracies Redistribute More Than Others." *American Political Science Review* 100, no. 2 (2006): 165–181.
- Katz, Lawrence F. "Technological Change, Computerization, and the Wage Structure." In *Understanding the Digital Economy: Data, Tools, and Research*, edited by Erik Brynjolfsson and Brian Kahin, 217–244. Cambridge, MA: MIT Press, 2001.
- Mehrotra, Santosh, and Jajati K. Parida. "Why is the Labour Force Participation of Women Declining in India?" *World Development* 98 (2017): 360–380.
- Pizzinelli, Carlo, John Bluedorn, and Era Dabla-Norris. "Artificial Intelligence and Jobs: Evidence from Online Vacancies." *IMF Working Paper 2023/089* (2023).
- Thelen, Kathleen. *Varieties of Liberalization and the New Politics of Social Solidarity*. New York: Cambridge University Press, 2014.
- Webb, Michael. "The Impact of Artificial Intelligence on the Labor Market." *SSRN Electronic Journal* (2020).

Author contact: dpetrov.iae@gmail.com

SUGGESTED CITATION:

Daniel Petrov, "Gendered Exposure to Artificial Intelligence in Labor Markets: A Comparative Political Economy Analysis of Bulgaria, Romania, Germany, and India", *real-world economics review*, issue no. 112, December 2025, pp. 108-125, <http://www.paecon.net/PAEReview/issue112/Petrov112.pdf>

You may post and read comments on this paper at <http://rwer.wordpress.com/comments-on-rwer-issue-112/>

End Matter

Board of Editors

Nicola Acocella, Italy, University of Rome
Robert Costanza, Australia, The Australian National University.
Wolfgang Drechsler, Estonia, Tallinn University of Technology
Kevin Gallagher, USA, Boston University
Jo Marie Griesgraber, USA, New Rules for Global Finance Coalition
Bernard Guerrien, France, Université Paris 1 Panthéon-Sorbonne
Michael Hudson, USA, University of Missouri at Kansas City
Anne Mayhew, USA, University of Tennessee
Gustavo Marqués, Argentina, Universidad de Buenos Aires
Julie A. Nelson, USA, University of Massachusetts, Boston
Paul Ormerod, UK, Volterra Consulting
Richard Parker, USA, Harvard University
Ann Pettifor, UK, Policy Research in Macroeconomics
Alicia Puyana, Mexico, Latin American School of Social Sciences
Jacques Sapir, France, École des hautes études en sciences sociales
Peter Söderbaum, Sweden, School of Sustainable Development of Society and Technology **Peter Radford**, USA, The Radford Free Press
David Ruccio, USA, Notre Dame University
Immanuel Wallerstein, USA, Yale University

ISSN 1755-9472

EDITOR: Edward Fullbrook,

ASSOCIATE EDITOR: Jamie Morgan

PAST CONTRIBUTORS: James Galbraith, Frank Ackerman, André Orléan, Hugh Stretton, Jacques Sapir, Edward Fullbrook, Gilles Raveaud, Deirdre McCloskey, Tony Lawson, Geoff Harcourt, Joseph Halevi, Sheila C. Dow, Kurt Jacobsen, The Cambridge 27, Paul Ormerod, Steve Keen, Grazia Ietto-Gillies, Emmanuelle Benicourt, Le Mouvement Autisme-Economie, Geoffrey Hodgson, Ben Fine, Michael A. Bernstein, Julie A. Nelson, Jeff Gates, Anne Mayhew, Bruce Edmonds, Jason Potts, John Nightingale, Alan Shipman, Peter E. Earl, Marc Lavoie, Jean Gadrey, Peter Söderbaum, Bernard Guerrien, Susan Feiner, Warren J. Samuels, Katalin Martinás, George M. Frankfurter, Elton G. McGoun, Yanis Varoufakis, Alex Millmow, Bruce J. Caldwell, Poul Thøis Madsen, Helge Peukert, Dietmar Lindenberger, Reiner Kümmel, Jane King, Peter Dorman, K.M.P. Williams, Frank Rotering, Ha-Joon Chang, Claude Mouchot, Robert E. Lane, James G. Devine, Richard Wolff, Jamie Morgan, Robert Heilbroner, William Milberg, Stephen T. Ziliak, Steve Fleetwood, Tony Aspromourgos, Yves Gingras, Ingrid Robeyns, Robert Scott Gassler, Grischa Periono, Esther-Mirjam Sent, Ana Maria Bianchi, Steve Cohn, Peter Wyncarczyk, Daniel Gay, Asatar Bair, Nathaniel Chamberland, James Bondio, Jared Ferrie, Goutam U. Jois, Charles K. Wilber, Robert Costanza, Saski Sivramkrishna, Jorge Buzaglo, Jim Stanford, Matthew McCartney, Herman E. Daly, Kyle Siler, Kepa M. Ormazabal, Antonio Garrido, Robert Locke, J. E. King, Paul Davidson, Juan Pablo Pardo-Guerra, Kevin Quinn, Trond Andresen, Shaun Hargreaves Heap, Lewis L. Smith, Gautam Mukerjee, Ian Fletcher, Rajni Bakshi, M. Ben-Yami, Deborah Campbell, Irene van Staveren, Neva Goodwin, Thomas Weisskopf, Mehrdad Vahabi, Erik S. Reinert, Jeroen Van Bouwel, Bruce R. McFarling, Pia Malaney, Andrew Spielman, Jeffery Sachs, Julian Edney, Frederic S. Lee, Paul Downward, Andrew Mearman, Dean Baker, Tom Green, David Ellerman, Wolfgang Drechsler, Clay Shirky, Bjørn-Ivar Davidsen, Robert F. Garnett, Jr., François Eymard-Duvernay, Olivier Favereau, Robert Salais, Laurent Thévenot, Mohamed Aslam Haneef, Kurt Rothschild, Jomo K. S., Gustavo Marqués, David F. Ruccio, John Barry, William Kaye-Blake; Michael Ash, Donald Gillies, Kevin P. Gallagher, Lyuba Zarsky, Michel tmoerBauwens, Bruce Cummings, Concetta Balestra, Frank Fagan, Christian Arnsperger, Stanley Alcorn, Ben Klarz, Sanford Jacoby, Kari Polanyi, P. Sainath, Margaret Legum, Juan Carlos Moreno-Brid, Igor Pauno, Ron Morrison, John Schmitt, Ben Zipperer, John B. Davis, Alan Freeman, Andrew Kliman, Philip Ball, Alan Goodacre, Robert McMaster, David A. Bainbridge, Richard Parker, Tim Costello, Brendan Smith, Jeremy Brecher, Peter T. Manicas, Arjo Klamer, Donald MacKenzie, Max Wright, Joseph E. Stiglitz, George Irvin, Frédéric Lordon, James Angresano, Robert Pollin, Heidi Garrett-Peltier, Dani Rodrik, Marcellus Andrews, Riccardo Baldissone, Ted Trainer, Kenneth J. Arrow, Brian Snowdon, Helen Johns, Fanny Coulomb, J. Paul Dunne, Jayati Ghosh, L. A. Duhs, Paul Shaffer, Donald W. Braben, Roland Fox, Stevan Harnad, Marco Gillies, Joshua C. Hall, Robert A. Lawson, Will Luther, JP Bouchaud, Claude Hillinger, George Soros, David George, Alan Wolfe, Thomas I. Palley, Sean Mallin, Clive Dilnot, Dan Turton, Korkut Ertürk, Gökcer Özgür, Geoff Tily, Jonathan M. Harris, Jan Kregel, Peter Gowan, David Colander, Hans Foellmer, Armin Haas, Alan Kirman, Katarina Juselius, Brigitte Sloth, Thomas Lux, Luigi Sapaventa, Gunnar Tómasson, Anatole Kaletsky, Robert R. Locke, Bill Lucarelli, L. Randall Wray, Mark Weisbrot, Walden Bello, Marvin Brown, Deniz Kellecioglu, Esteban Pérez Caldentey, Matias Vernengo, Thodoris Koutsobinas, David A. Westbrook, Peter Radford, Paul A. David, Richard Smith, Russell Standish, Yeva Nersisyan, Elizabeth Stanton, Jonathan Kirshner, Thomas Wells, Bruce Elmslie, Steve Marglin, Adam Kessler, John Duffield, Mary Mellor, Merijn Knibbe, Michael Hudson, Lars Pålsson Syll, Jane D'Arista, Ali Kadri, Egmont Kakarot-Handtke, Ozgur Gun, George DeMartino, Robert H. Wade, Silla Sigurgeirsdóttir, Victor A. Beker, Pavlina R. Tcherneva, Dietmar Peetz, Heribert Genreith, Mazhar Siraj, Hazel Henderson, Nicolas Bouleau, Geoff Davies, D.A. Hollanders, Richard C. Koo, Jorge Rojas, Marshall Auerback, Fernando

García-Quero, Fernando López Castellano, Robin Pope and Reinhard Selten, Patrick Spread, Wilson Sy, Fred Moseley, Shimshon Bichler, Johnathan Nitzan, Nikolaos Karagiannis, Alexander G. Kondeas, Roy H. Grieve, Samuel Alexander, Asad Zaman, L. Frederick Zaman, Avner Offer, Jack Reardon, Yinan Tang, Wolfram Elsner, Torsten Heinrich, Ping Chen, Stuart Birks, Dimitrios Koumparoulis, Arne Heise, Mark Jablonowski, Carlos Guerrero de Lizardi, Norbert Häring, William White, Jonathan Barzilai, David Rosnick, Alan Taylor Harvey, David Hemenway, Ann Pettifor, Dirk Helbing, Douglas Grote, Brett Fiebiger, Thomas Colignatus, M. Shahid Alam, Bryant Chen, Judea Pearl, John Pullen, Tom Mayer, Thomas Oechle, Emmanuel Saez, Joseph Noko, Joseph Huber, Hubert Buch-Hansen, Brendan Sheehan, C P Chandrasekhar, Heikki Patomäki, Romar Correa, Piet-Hein van Eeghen, Max Koch, John Robinson, Oscar Ugarteche, Taddese Mezgebo, Donald Katzner, Crelis F. Rammelt, Phillip Crisp, John B. Benedetto, Alicia Puyana Mutis, Leon Podkaminer, Michael Kowalik, Mohammad Muaz Jalil, José A. Tapia, Robert W. Parenteau, Alan Harvey, C. T. Kurien, Ib Ravn, Tijo Salverda, Holger Apel, John Jeffrey Zink, Severin Reissl, Christian Flamant, Rainer Kattel, Amit Bhaduri, Kaustav Banerjee, Zahra Karimi Moughari, David R Richardson, Emil Urhammer, Michel Gueldry, Rüya Gökhan Koçer, Hee-Young Shin, Kevin Albertson, John Simister, Tony Syme, Geoff Tily, Ali Abdalla Ali, Alejandro Nadal, Steven Klees, Gary Flomenhoft, Bernard C. Beaudreau, William R. Neil, Ricardo Restrepo Echavarría, Carlos Vazquez, Karen Garzón Sherdek, Paul Spicker, Mouvement des étudiants pour la réforme de l'enseignement en économie, Suzanne Helburn, Martin Zerner, Tanweer Akram, Nelly P. Stromquist, Sashi Sivramkrishna, Ewa Anna Witkowska, Ken Zimmerman, Mariano Torras, C.P. Chandrasekhar, Thanos Skouras, Diego Weisman, Philip George, Stephanie Kelton, Luke Petach, Jørgen Nørgård, Jin Xue, Tim Di Muzio, Leonie Noble, Kazimierz Poznanski, Muhammad Iqbal Anjum, Pasquale Michael Sgro, June Sekera, Michael Joffe, Basil Al-Nakeeb, John F. Tomer, Adam Fforde, Paulo Gala, Jhean Camargo, Guilherme Magacho, Frank M. Salter, Michel S. Zouboulakis, Prabhath Jayasinghe, Robert A. Blecker, Isabel Salat, Nasos Koratzanis, Christos Pierros, Steven Pressman, Eli Cook, John Komlos, J.-C. Spender, Yiannis Kokkinakis, Katharine N. Farrell, John M. Balder, Blair Fix, Constantine E. Passaris, Michael Ellman, Nuno Ornelas Martins, Jason Hickel, Eric Kemp-Benedict, Sivan Kartha, Peter McManners, Richard B. Norgaard, William E. Rees, Joachim H. Spangenberg, Lia Polotzek, Per Espen Stoknes, Imad A. Moosa, Salim Rashid, Richard Vahrenkamp, Dimitri B. Papadimitriou, Michalis Nikiforos, and Gennaro Zezza, Abderrazak Belabes, Phil Armstrong, Bruno Bonizzi, Annina Kaltenbrunner, Jo Michell, Dirk H. Ehnts, Maurice Höfgen, Richard Murphy, Louis-Philippe Rochon, Malcolm Sawyer, Jan Toporowski, Kenneth Austin, Duncan Austin, Kalim Siddiqui, Arthur M. Diamond, Jr., Theodore P. Lianos, John E. Coulter, Gerald Holtham, Jaehye Choi, Girol Karacaoglu, Geoff Crocker, Andri W. Stahel, Gregory A. Daneke, Joaquim Vergés-Jaime, Hardy Hanappi, Rosemary Batt, Patrick Pobuda, Ulrich Thielemann, Tanja von Egan-Krieger, Steve Roth, Ron Wallace, John Gowdy, Blair Fix, Juan Pablo Bohoslavsky, Francisco Cantamutto, Manuel Ramon, Renan Veronesi Souza Luz, Ramon Garcia Fernanbdez, Shimshon Bichler, Jonathan Nitzan, Constantine E. Passaris, Junaid B. Jahangir, Ted Trainer, George H. Blackford, Felix van Hoften, Rob van der Rijt, Mark Diesendorf, Fidel Aroche Reyes, Marc Pilkington, Ahmad Seyf, Ceyhun Elgin, Giandomenico Scarpelli, Tim van 't Loo, Helmut Nechansky, Lloyd G. Adu Amoah.

Articles, comments on and proposals for should be sent to the editor at
pae_news@btinternet.com

Subscriptions to this email journal are free to all members of the World Economics Association (WEA). WEA memberships are free at <http://worldeconomicsassociation.org/>

Back issues of this journal and material related to the PAE movement are available at
www.paecon.net.

To subscribe to this journal go [here](http://www.feedblitz.com/f/f.fbz?Sub=332386) (<http://www.feedblitz.com/f/f.fbz?Sub=332386>)

To unsubscribe to this journal go to

<http://www.feedblitz.com/f/f.fbz?EmailRemove=NDUzNDkzMHWzMzIzODZ8cGFIX25ld3NAYnRpbmRlcm5ldC5jb218MTA5OTU4>