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INFLATION IN THE ANTHROPOCENE: A LONG-RUN MODEL OF GROWTH, CLIMATE DAMAGE AND CONFLICT INFLATION

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ABSTRACT

Human impact on the climate-system is leading to a world which is experiencing intensified extreme weather events, extreme heat, droughts, floods, storms, sea-level rise and changing weather patterns. The combined effects of these shocks negatively impact a broad range of factors in human life, from wellbeing and health, to agriculture, to power generation, to industry, to logistics. These changes have clear macroeconomic significance. Integrating empirical evidence and Earth-science based insights on climate damage and supply chain disruption with frameworks stemming from Ecological macroeconomics and Conflict-Inflation Theory, this paper showcases how inflationary pressures are a consequence of climate destabilisation. The analytical model proposed is an Ecological conflict-inflation model based on a Classical Keynesian model of economic growth. It showcases how climate-induced disruption to the prices of systematically significant inputs, capital destruction and depreciation, labor productivity losses, or labour market shocks trigger inflation and thus distributional conflicts between different classes. Simulated shocks showcase persistent inflationary pressures. The brunt of these climate shocks are absorbed in general by classes with less structural power. The preponderance of supply-side dynamics in the determination of inflation in the Anthropocene also means that price stabilisation measures will have to go beyond just monetary policy.

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Inflation in the Anthropocene: a long-run model of growth, climate damage and conflict inflation

Liam Mc Court (University of Siena)

Abstract

Human impact on the climate-system is leading to a world which is experiencing intensified extreme weather events, extreme heat, droughts, floods, storms, sea-level rise and changing weather patterns. The combined effects of these shocks negatively impact a broad range of factors in human life, from wellbeing and health, to agriculture, to power generation, to industry, to logistics. These changes have clear macroeconomic significance. Integrating empirical evidence and Earth-science based insights on climate damage and supply chain disruption with frameworks stemming from Ecological macroeconomics and Conflict-Inflation Theory, this paper showcases how inflationary pressures are a consequence of climate destabilisation. The analytical model proposed is an Ecological conflict-inflation model based on a Classical Keynesian model of economic growth. It showcases how climate-induced disruption to the prices of systematically significant inputs, capital destruction and depreciation, labor productivity losses, or labour market shocks trigger inflation and thus distributional conflicts between different classes. Simulated shocks showcase persistent inflationary pressures. The brunt of these climate shocks are absorbed in general by classes with less structural power. The preponderance of supply-side dynamics in the determination of inflation in the Anthropocene also means that price stabilisation measures will have to go beyond just monetary policy.

Introduction

Mankind's economic activity is destabilising key functions of Earth's climate system, with forecasted warming to lie between 2.5° and 3° by the year 2100 (IEA, 2025). Even if current trends are mitigated, an increase in the frequency and scope of extreme climate events, such as heatwaves, droughts, floods, storms, and sea-level rise, is inevitable. The effects of these disruptions have significant economic implications: climate change impacts everything from migration to mortality rates (Watts et al, 2021; Gasparrini et. al, 2014), from worker productivity (Dasgupta et. al, 2021; Venugopal et. al, 2026) to agricultural output (Hultgren et al, 2025), from infrastructure to power generation (Hinkel et. al, 2014; Turner et. al, 2022).

Growing evidence points to the fact that a very relevant political economy effect of climate disruption is inflation. Empirical literature on this is quite consensual, and finds a positive and non-linear link between climate damage and price pressures (Kotz et. al, 2023; Qi et. al 2025; Li et. al, 2023). This said, the topic of inflation as an important transmission mechanism from climate change to the macroeconomy is underdeveloped in economic literature. Davila-Fernandez et. al, (2025) and Bacchiocchi et al, (2025) approach the issue from the standpoint of Environmental Economics, treating it as a question of monetary policy tradeoffs. Ryan-Collins et. al (2026) make a more promising case, by outlining an ecologically-integrated framework for understanding inflation as a socio-ecological phenomenon. This paper is born out of the same insights, and provides a novel approach to outline inflation as a key consequence of climate-induced supply-side disruption, and of supply-chain destabilisation. It expands a Post-Keynesian demand-led, but supply constrained model of economic growth (Fazzari et. al, 2020) with ecological insights, by detailing key transmission channels from climate change to the political economy: labour force dynamics, labour productivity, capital destruction and obsolescence, and supply-chain shocks to systemically significant inputs (Weber et. al, 2024). The model accounts for inflationary pressures through a conflicting claims framework (Rowthorn, 1977; Morlin & Pariboni, 2024), and showcases how the question of distribution will be central for price stabilisation policies in an unstable climate.

Numerical simulations integrate the theoretical results, and find that these feed-in channels indeed cause inflationary pressures, which tend to be quite persistent in nature. Shocks that directly impact the supply-side of the economy tend to be more severe than those to systemically significant inputs. The simulations also find that the distributional implications of these shocks are quite profound: the class with the least structural power will absorb most of the shocks, whilst more significant labour power would lead to stronger inflationary dynamics.

The contribution of this paper offers further evidence that, as outlined by Weber & Schulken (2024) and Ryan-Collins et. al, (2026), price stabilisation measures in the Anthropocene cannot be left merely to central banks, but that a holistic economy-wide approach is essential. Both short-term shock absorption policies and longer term price stabilisation interventions will be necessary to progressively contain climate-induced price instabilities.

The rest of the paper is structured as follows: Section 1 reviews the literature, Section 2 presents the model, Section 3 discusses the equilibrium solutions, Section 4 outlines the results of the simulations, and Section 5 concludes.

1. Literature review

1.1. The Anthropocene, human wellbeing, and the macroeconomy

According to climate science, Mankind's *"appropriation of Earth's primary production"* (Richardson et. al, 2023. p. 1) is destabilising key functions of our Planet's climate system. Efforts to curb emissions have failed: one decade after the signing of the landmark deals, the pace of warming itself is accelerating (Ripple et. al, 2025), and the year 2025 was the hottest on record: 1.55° warmer than the pre-industrial period (World Meteorological Organisation, 2025). According to the International Energy Agency's (IEA) 2025 World Energy Outlook, under the Current Policy Scenario (CPS), global greenhouse gas emissions are set to stagnate at around the level recorded in 2024 with global warming set to be at 3° higher than pre-industrial levels by 2100. The more optimistic Stated Policy Scenario (STEPS) sets global warming to be at around 2.5° by 2100. Both levels are beyond what climate science deems safe operating spaces for Mankind.

In the short-term, the intensification of extreme weather events, floods, droughts, storms, floods and heatwaves are a certainty. The implications of this for human wellbeing and the economy are projected to be profound. Lenton et. al, (2024), find that, in a scenario where currently pledged policies are implemented (corresponding to 2.7° of warming by 2100), more than 30% of humanity would be living outside of optimal temperatures for human health. Extreme heat has very significant effects on health: it is linked to an increase in the outbreak of epidemics and disease, miscarriages, and higher mortality rates (Watts et al, 2021; Gasparrini et. al, 2014), and even to decreased cognitive capacity (Park et. al, 2020). Temperature extremes have been shown to decrease worker productivity (Burke et. al, 2015; Dasgupta et. al, 2021; Venugopal et. al, 2026), and are projected to cause substantial migratory flows (Daoust & Selby, 2024; Balsari et. al, 2020)).
Extreme heat is not the only mechanism through which the climate affects Mankind's wellbeing. Changing weather patterns will cause increased periods of sustained drought, periods of intense rain, storms, hailstones, wildfires, and floods, which will negatively impact a plethora of human activities. Droughts affect power generation as the water used by power plants either to generate electricity or to cool down becomes scarce or too warm (Turner et. al, 2022; Gutting et. al, 2024). Insufficient levels or rainfall also affect logistics in key global waterways (Zhen et. a, 2025; Hogan, 2026) driving up transport costs. Similarly, fresh water availability is key to a very large number of industrial processes (Kilimani et. al, 2018), and is the bedrock of essential utility services. Agriculture also stands to be strongly impacted by climate change: Hultgren et al, (2025), for example, find that global crop yield could fall by around 30% by 2100. Finally, one must factor in the effect of sea-level rise, which will have the potential to impact fresh water source access, agriculture, and coastal infrastructure (Hinkel et. al, 2014).

The political economy effects of such disruptions are bound to be profound, and can be compared to a series of macroeconomic supply shocks (Baleyte et. al, 2024). Like with other forms of shocks to supply, they are bound to show up on prices and, hence, cause inflationary pressures. Empirical literature backs up this intuition, and is finding more and more evidence for a direct connection between inflation and climate damage. Qi et. al., 2025; Li et. al (2023), for example, exploit global datasets, and find a positive and non-linear effect connecting extreme weather with consumer price index (CPI) fluctuations. Others (Odongo et. al, 2022), have attempted similar exercises, but focusing on extreme weather events for countries in East and South Africa, whilst Beirne et. al (2025), reach analogous conclusions for Europe. More sector-specific publications also show results in line with the abovementioned conclusions: Kotz et. al., (2023) find that, due to climate change, by the mid-2030s, headline inflation could increase by 0.32-1.18%, whilst food inflation by around 0.92-3.23%. Cevik & Gwon, (2024), finally, focus on supply chain disruption, and, again, find that extreme weather results in inflationary pressures.

As empirical evidence appears to point to new sources of price pressures, monetary authorities appear to be coming to understand that a new era of inflation governance is at hand. Isabel Schnabel, member of the European Central Banks' (ECB) Executive board, during a speech at the 2022 ECB's Watchers Conference, sustained the thesis that the low inflation rates experienced in mature economies in the past 30 years are over, and that a new period of "climateflation", "fossilflation", and "greenflation" was to be expected in the future. This understanding of the impact of climate change on prices is currently recognised as both a reality and a risk factor both by the ECB in its Monetary Policy Decisions (2025) and the Bank of England's (BoE) Monetary Policy Reports (2025).

1.2 Economic discourse

Whilst both empirical evidence and policy discussions increasingly point to the relevance of climate-induced inflationary pressures, economic literature appears to be still lagging behind. Recent contributions on these topics can be boiled down to two broad approaches: one which is more closely connected to Environmental Economics, and one which is closer to Ecological Economics with Post-Keynesian insights.

Notable contributions from Environmental Economics, such as Davila-Fernandez et. al, 2025, or Bacchiocci et. al, (2025), tend to build on Neoclassical growth models, or models of Overlapping Generations (OLG) to assess what the role of monetary policy should be in various scenarios of "climateflation" and "greenflation", and how climate damage may affect economic agents' inflation expectations. Whilst these approaches do have the merit of introducing the debate to the economic discourse, they tend to have a simplified representation of the channels through which climate change actually causes inflationary pressures, and to reduce the issue to a question of monetary policy tradeoffs. An interesting bridge between this and a more broad approach can be found in Cevik & Gwon's (2024) empirical paper, where they argue that "*Central bankers should consider the impact of weather anomalies on supply chains and inflation dynamics to prevent entrenching second-round effects and de-anchoring of inflation expectations. More directly, however, governments can invest more for climate change adaptation to strengthen critical infrastructure and thereby minimize supply chain disruptions.*" p. 1.

This last perspective contains an insight that is central in the contributions stemming from Post-Keynesian and Ecological Economics. In particular, the common thread that unites them is the understanding that price stabilisation policies within an economy under constant supply-shocks cannot be left solely to monetary authorities (Michell, 2023; Weber & Schulken, 2024; Ryan-Collins et. al, 2026; Jackson et. al, 2026). This argument is usually built upon a more detailed overview of the channels through which climate-induced supply shocks cause inflationary pressures, which in of itself is a result of a more accurate representation of the interaction between the environment and the economy.

To the best of the knowledge of the author, a first step in this direction was taken by Michell (2023), Weber et. al, (2024; 2024a; 2025), and Weber & Schulken (2024). These authors integrate insights from Post-Keynesian and Ecological Economics traditions to account for how climate change will affect various aspects of the macroeconomy, including inflation. It must be noted that Post-Keynesian economics, in fact, has a refined theory of the inflationary process (Rowthorn, 1977; Dutt, 1987; Lavoie, 2022; Hein, 2024), which has seen developments and advances following the inflationary episodes of the COVID-19 Pandemic and of the Russian invasion of Ukraine (for example, Weber & Wasner, 2023; Nikoforos et. al, 2022). Michell (2023), builds on this literature in *"Macroeconomic policy at the end of the age of abundance"*, and outlines how the combined effect of stringent carbon budgets and disruption to production due to climate damage, poses a series of supply constraints to traditional progressive policy makers. On the issue of commodity supply disruption, the paper argues: *"the case of a relatively sudden reduction in the global supply of commodities such as food and energy for which supply is highly inelastic. Even small reductions in supply can lead to substantial increases in price. For import-dependent countries, these shocks show up as terms of trade shocks. Even in countries which are net exporters, households and businesses will face the new global price, so these shocks are experienced as lower average disposable income. Such shocks have substantial distributional impact [...]"* (p. 371). This perspective is perhaps developed in the most comprehensive and detailed way by Isabella Weber and other economists (Weber et. al, 2024 ; Weber & Schulken, 2024; Weber et. al, 2025). The detailed work she and others carried out on how supply-side shocks can translate into inflationary episodes (Weber & Wasner, 2023) and how these can propagate through supply chains (Weber et al, 2025), contributed to the refinement of the Post-keynesian theory of inflation, but also to connect it to the topic of climate change. Within the framework developed, a particularly sensitive component are the prices of certain key commodities and durable goods (such as homes), which were dubbed by Weber et al, (2024) *"Systemically significant prices"*, which are particularly relevant in the context of global climate disruption. Very recently, Ryan-Collins et. al, (2026) further systematise findings resulting from empirical studies, connecting them to Post-Keynesian conflict inflation theory (Hein, 2023) and Ecological Economics, to outline a theory of inflation as a socio-ecological phenomenon. This exercise is partly mirrored by Jackson et. al, (2026), who focus on proposing a new price stabilisation regime, built around fiscal-monetary coordination to favour decarbonisation and stabilise short-term price shocks.

1.3 Systemically significant prices and the climate system

Systematically significant prices are central to the analysis of an economic systems' vulnerability to external shocks. They can be roughly defined as *"the most vulnerable points in the price system"* (Weber et. al, (2024), p.300). More specifically, they are prices whose fluctuation has particular significance for the consumer price index (CPI). This definition is derived from literature concerning strategically significant industries (Haimes & Jiang, 2001) and prices which are particularly important for the stability of the financial system (Hockett & Omarova, 2016). These last authors, in particular, coin the term, and define prices of systemic significance as having to require the following criteria: (1) Ubiquity of the underlying value as a productive input, (2) Ubiquity of the underlying value as an investment asset, (3) Ubiquity of use of the price or index as a benchmark. Weber et. al, (2024) build on this definition, further specifying that, for a price category to be systemically significant, it must have a tendency to fluctuate: *"to study the importance of specific industries for overall monetary stability, we are not only interested in the structural importance of an industry as captured by the ubiquity of its products, but also in the degree to which its prices tend to fluctuate, since we know that price volatility varies greatly across different sectors."* (p.301). In other words, the prices of systemically significant commodities are prone to more significant price fluctuations than the general CPI and are also a significant component of the productive process of a series of industries whose output is both part of production, but also of final consumption. Fluctuations of these categories of prices propagate throughout the economy, and amplify particular price shocks. The authors identify the following categories as being systemically significant: (1) energy&utilities, (2) basic necessities, (3) basic production inputs other than energy (4) and commercial infrastructure[1].

[1] Energy includes the fossil fuel supply-chain, as well as the utilities industry, which includes energy infrastructure (power grids, gas transmission and distribution, and power generation), but also water, sewage treatment and so on. Basic necessities is a category that includes the foodstuff supply chain from farm to supermarket. Basic production inputs other than energy, on the other hand, includes the output of the chemical industry (including products that

The authors also specify that the extent to which such price categories are systemically significant evolves through time, changing due to the structural transformations of economies and due to climate destabilisation. This last topic is of key importance for the purpose of this paper, as many of the prices which are considered strategically significant are also exposed to climate damage: from farm and crop yields to power generation, from industrial processes to utility service delivery, and so on.

2. Inflation, Conflict and Climate: a Post-Keynesian-Ecological Economics Model

This paper proposes a Conflict-Inflation framework (Rowthorn, 1977) embedded within a Classical Keynesian model of economic growth, namely the Sraffian Supermultiplier (Serrano, 1995). The conflicting claims interplays with the Supermultiplier in a manner similar to that proposed by Morlin & Pariboni (2024). The model is incorporated within an Ecological Economics framework: the growth process of the economy is demand-led, but climate-induced supply-side constraints and vulnerabilities may condition it significantly. As is common in Post-Keynesian literature, the production process of the economy is built on a Leontief production function, where a single good, which is both a consumption and a capital good (Pasinetti, 1983), is produced utilising capital, labour and goods from the systemically significant prices category (Weber et. al, 2024), which in this paper are reframed as systemically significant inputs. In line with other examples of supply-side integration into demand-led dynamics, the growth of the supply-side of the economy is dependent on labour productivity, capital stock growth, and labour force dynamics (Fazzari et. al, (2020); Fazzari & Gonzaléz (2025). This framework is expanded to incorporate ecological factors. In line with the abovementioned insights from empirical literature, the labour force, labour productivity, the growth rate of capital, the stock of capital and the prices of systemically significant inputs may be influenced by climate damage. Supply-side disruptions may cause supply to fall below the levels determined by aggregate demand, leading to inflationary pressures determined by climate-induced scarcities. Furthermore, shocks to systemically significant inputs, which are also part of the workers' consumption bundle, may also cause disruptions to supply and directly affect workers' purchasing power.

Finally, the model depicts how inflationary dynamics may persist through time. Firstly, conflicting claims between different social classes (workers and capitalists) may lead to profit-led or wage-led inflationary pressures as both workers and capitalists fight to defend their share of the income

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play an important role in a consumer's CPI such as soap and other cleaning products) and other basic commodity inputs. Commercial infrastructure, finally, includes wholesale trade, which is a rather broad category which captures the intermediaries in an economy. According to the U.S. Bureau of Statistics, wholesalers sell "the outputs of agriculture, mining, manufacturing, and certain information industries, such as publishing".

produced. Secondly, if climate disruption to supply is sufficient, the supply-side of the economy may lag behind effective demand, determining scarcity-induced price pressures.

2.1 The Supply-Side

In line with Post-Keynesian frameworks, the supply side of the economy is modelled as a Leontief production function. The production process is undertaken utilising a given number of labour hours (L_t) the workforce is willing to work, considering a certain productivity of labour (A_t) for a given real wage (w_t) and a given amount of internationally priced systemically significant inputs (I_t), with i_t indicating the "systemically significant input-intensity" of the economy in a manner similar to energy intensity in Centeno, (2025). The term M_t indicates non-systemically significant inputs. Adding this term to the production function input intensity within the production process, and thus the degree of exposure of the economy to an input-cost price shock. Finally, the production is carried out utilising gross capital goods (K_t) in proportion to output, we can thus define a capital-output ratio (v_t).

(1) $$Y_t^S = min\,[A_t L_t; \frac{I_t}{i_t}; \frac{M_t}{m_t}; \frac{K_t}{v_t}]$$

The dynamics of the labour force evolve according both to exogenous demographic factors, such as fertility, ageing, labour force participation, migration, or war as represented by the term β_o. As stated above, literature increasingly finds that climate change will affect migration patterns (Balsari et. al, 2020), mortality and fertility (Watts et al, 2021; Gasparrini et. al, 2014), but also factors such as epidemics. It is thus logical to embed this term within climate dynamics: the above factors could lead to a decrease (increase) in the exogenous growth rate of the labour force, thus decreasing (increasing) the growth rate of supply. Alongside exogenous dynamics, the growth rate of the labour force evolves following the unemployment rate (u_t), as in Fazzari, Ferri & Variato, (2020), and Morlin & Pariboni, (2024). This because lower levels of unemployment, and thus scarcity of workers, encourages inactive, underemployed, or migrant workers to join the workforce. The growth of labour supply (g_N) is modelled as follows:

(2) $$g_N = \beta_o - \beta_1 u_t$$

Growth of labour productivity (g_A) follows the outlined in Dutt (2006) and Fazzari, Ferri & Variato (2020). It is positively influenced by exogenous factors (such as technical change, learning by doing etc., captured by ρ_o), by the installation of new, more technologically advanced capital stock (ρ_3), and by dynamics in the labour market (ρ_2), whereby a scarcity of labour force availability due low unemployment or demographic decline may encourage labour-saving innovations. In line with findings from empirical literature (Burke et. al, 2015), this equation is expanded to include the negative climate-induced effects on labour productivity, captured by the term ξ_{At}. Consequently, labour productivity evolves in the following manner:

(3) $$g_A = \rho_o - \rho_1 u_t + \rho_3 g_K - \rho_4 \xi_{At}$$

The growth of the supply-side of the economy can consequently be represented as follows:

(4) $$g_{Ys} = min\{g_N + g_A, g_K\}$$

With the growth rate of the labour force, labour productivity and of the capital stock determining the growth rates of supply. Thus, both g_N, g_A and, as will be seen later on, g_K, are embedded within climate dynamics.

2.2 Demand-led but supply constrained growth

The demand-side of the economy, described here by a Sraffian Supermultiplier (Serrano, 1995), which leads the growth process as is typical in Post-Keynesian frameworks. Like with supply, and in a manner not dissimilar from Centeno (2025), demand is also integrated into Ecological dynamics. In this case, however, there is a greater focus on the channels through which climate damage impacts the economy rather than on the energy transition. The effects depicted on the demand-side are the following: capital accumulation is directly affected through capital destruction and through dynamics of accelerated capital obsolescence. Furthermore, climate-induced shocks may also reduce the speed with which investment recovers to rebuild destroyed or damaged capital.

However, the demand-side of the economy interacts with supply (Dutt, 2006; Fazzari, Ferri & Variato 2020), and may be constrained by it. This mechanism is depicted in the following manner:

(5) $$Y_t = min\,(Y_t^D; Y_t^S)$$

Where Y_t^S represents output produced on the supply-side of the economy, and Y_t^D represents demand. In Fazzari et. al, (2020), a mismatch between supply and desired demand causes an increase in unemployment. These dynamics of labour force adjustments to demand and supply mismatches usually entail longer time horizons than those which this paper endeavours to capture. In particular, the goal of integrating demand with supply is that of depicting how price dynamics may act to constrain demand when output falls below desired levels due to climate damage or to shocks to systemically significant inputs. For this reason, this paper proposes the argument that a potential mismatch between supply and desired demand, when unexpected, may be a factor which leads to inflation, so that if $Y_t^D = Y_t > Y_t^S$, then this mismatch will produce a positive effect $\delta_t = \frac{Y_t^D}{Y_t^S} - 1$ effect on inflation. If $Y_t^D = Y_t < Y_t^S$, on the other hand $\delta_t = 0$, as evidence points that reductions in prices are far less significant than price increases (Peltzmann, 2000).

2.3 The demand side

Within the Sraffian supermultiplier framework,capacity-generating investment as well as consumption from wages are induced from the circular flow of income (Serrano, 1995). The growth process of the economy is consequently led by the autonomous (meaning non-capacity generated) components of demand. It can be thus represented as follows:

(6) $$Y_t^D = \sigma_t Z_t$$

where Y_t^D is demand-determined output, Z_t is the autonomous component of demand[2], and σ_t is the supermultiplier. The latter is expressed as follows:

(7) $$\sigma_t = \frac{1}{(1-c_t-h_t+i_t+m_t)}$$

where c_t is the propensity to consume out of wages, h_t is the propensity to invest, i_t are imports of systemically significant prices, and m_t are other non-systemically significant inputs (which are priced internationally). As is standard in Classical Keynesian literature (for example in Morlin & Pariboni, 2024), the propensity to consume is determined as a linear relationship related to workers wage share at time t (ω_t). In this case, the term is expanded to account for workers' purchasing power, which can be directly affected by an external shock to systemically-significant inputs through a mechanism not dissimilar from a terms of trade shock in an open economy (see Morlin, 2023). The purchasing power effect is represented by τ_t. The propensity to consume can thus be described as follows:

[2] The autonomous components of demand includes those elements which are not capacity generating nor are financed by contractual wage income (Serrano, 1995), and may include exports (Nah & Lavoie, 2017), government expenditures (Allain, 2015), and residential or speculative investments (Pérez-Montiel and Pariboni, 2022), and capitalists' propensity to consume.

(8) $$c_t = \phi \tau_t \omega_t$$

where ϕ indicates the linear relationship between the wage share and the marginal propensity to consume. The τ_t accounts for the purchasing power of workers through a simple formula which represents the ratio between workers real ($w_t\,real$) and nominal wages(w_t) at times t[3]:

(9) $$\tau_t = \frac{w_t\,real}{w_t}$$

Initially, (τ_t) is equal to unity as real and nominal wages coincide. However, a price increase in systemically significant inputs would lead to real wage losses.

The propensity to invest follows a flexible accelerator mechanism such as that of Freitas and Serrano (2015):

(10) $$\dot{h}_t = h_t \gamma_t (\mu_t - \mu_n)$$

where $\dot{h}_t$ is the change in the propensity to invest, μ_t is the degree of capacity utilisation at time t, and μ_n is the normal degree of capacity utilisation. The term γ_t indicates the speed with which investment adapts to changes in capacity utilisation. When the economy is shocked, or when capital is destroyed or is damaged, capacity utilisation in the remaining capital stock increases in order to rebuild and to satisfy desired demand. However, as climate change puts increasing stress on our economies, and on banking and financial sectors (Kron et. al, 2019; Damette et. al, 2026), it is logical to consider that investment may recover in a slower manner than would be expected in ordinary conditions. For this reason, after a shock climate shock, this paper proposes a decrease in γ which would amount to a slowdown in the recovery in the propensity to invest.
We define $g_y = \frac{\dot{Y}}{Y}$ and $g_z = \frac{\dot{Z}}{Z}$ as the growth rates of output and autonomous demand. Thus, the growth rate of output can be expressed in the following manner:

(11) $$g_y = g_z + (\dot{c}_t + \dot{h}_t)\,\sigma_t$$

and by substituting in this formulation thus formulation $\dot{c}_t$ with $\dot{c}_t = \phi\dot{\omega}_t$ and $\dot{h}_t$ with (10):

[3] The real and nominal wages are calculated from a CPI composed of prices and quantities of the goods present in the economy under consideration.

$$g_y = g_z + \sigma_t \phi \tau_t \dot{\omega}_t + \sigma_t h_t \gamma(\mu_t - \mu_n)$$

Capacity output, or the level of output which can be obtained for a given stock of capital at full capacity, is expressed as below:

(12) $$Y_{Kt} = \frac{1}{v} K_t$$

where v_t is the technical capital-output ratio and K_t is the capital stock at times t. Considering that $K_t = I_t / Y_t = h_t$. Furthermore, the growth rate of capital is $g_{kt} = \frac{\dot{K}}{K}$. Thus:

(14) $$g_{kt} = (\frac{I_t / Y_t}{v}) \mu_t - d'$$

$$g_{kt} = \left(\frac{h_t}{v}\right) \mu_t - d'$$

Where d' is the depreciation rate of capital. This term is determined both by expenditures to renew capital, to expand the capital stock, to replace obsolete capital, and to rebuild destroyed or damaged capital. Following a similar logic to that of Steindl (1979), who expanded d' to include the physical drop out rate as a ratio of gross capital, this paper proposes to expand the depreciation term to explicitly include the abovementioned factors. Following this logic, d' accounts also for climate-related factors. In fact, when firms allocate funds for renewing machinery and other fixed capital stock, they naturally consider issues relating to their expected level of environmental "wear and tear", and to the expected lifetime of capital stock. With regards to this last aspect a myriad of factors can be taken into consideration: from technical innovation, to the expected lifespan of a given plant, to expectations on structural transformations within an economy. Under a political economy which is grappling with the effects of a destabilising climate system, there may well be a significant difference between the expected level of climate damage when a capital was built and its actual level. Similarly, climate dynamics may accelerate the expected speed of obsolescence of part of the capital capital stock as areas become prone to flooding, storm damage, sea level rise etc.

Following Steindl's (1979) intuition on stagnating economies, it can be stated that the expected levels of climate damage and capital obsolesce and their actual levels would possibly only be coincident within a steady state system, with stable and predictable climate outcomes. These effects are captured in the following manner: the depreciation rate of capital is defined as the reciprocal of its expected lifetime at times t (n') as in Steindl (1979) and Bhaduri (1972). The expected lifetime is considered to be equal to its expected lifetime minus the expected level of obsolescence of given capital (o'_t) and the expected environmental "wear and tear" (ξ'_t):

$$d' = \frac{1}{n_t}$$

with $n_{t0} = n' - o'_t - \xi'_t$. It is perhaps important to note, that in case of heterogeneous equipment with different lifetimes d' is the reciprocal of the weighted harmonious mean of the different lifetimes, expected exposures to climate damage and expected obsolescences Bhaduri, (1972). For the reasons outlined above, the expected lifespan of the capital stock may be different from its actual lifespan. We thus define actual obsolescence factors as o_t and actual climate damage at time t as ξ_t. This means that: $n_t = n' - o_t - \xi_t$.

In line with Morlin & Pariboni (2024), the growth rate of capacity utilisation changes with the propensity to consume (8), propensity to invest (10), and changes in the capital stock (14). Naturally, within this framework, these terms are embedded to account for climate dynamics and cost shocks to systemically significant inputs. We can thus write the law of motion of capacity utilisation as:

(15) $$\dot{\mu}_t = \mu_t[(g_z + \sigma_t \phi \tau_t \dot{\omega}_t + \sigma_t h_t \gamma(\mu_t - \mu_n) - (\frac{h}{v}\mu_t) + d']$$

Finally, as in Fazzar et. al, (2020) and Morlin & Pariboni (2024), the growth rate of output determines the growth of labour demand, with unemployment being the difference between labour supply and labour demand. Thus $g_L = g_y$ and $\hat{u} = \frac{1-u_t}{u_t}(g_N - g_L)$. From this expression we substitute with (2) and (11). This can lead us to write the change in the rate of unemployment as follows:

(16) $$\hat{u} = \frac{1-u_t}{u_t}\zeta(\beta_o - \beta_1 u_t + g_A - g_z - \sigma_t \phi \tau_t \dot{\omega}_t - \sigma_t h_t \gamma(\mu_t - \mu_n))$$

The term ζ indicates the imperfect adjustment between labour demand and supply, and how this translates to the rate of change in unemployment.

2.4 The conflicting claims framework

The conflicting claims framework of the model is inspired by Rowthorn‘s seminal contribution (1977), and by Morlin and Pariboni’s extension of this to Classical Keynesian growth theory (2024). As is typical in Post-Keynesian conflicting claims frameworks, the wage setting dynamics pursued by workers are heavily influenced by political, institutional, and cultural variables. Likewise, the price-setting policies pursued by firms depend on a wide range of factors varying:

from the degree market consolidation to the structure and "upstreamness" (Weber et. al, 2024) of different industrial sectors (Tropeano, 2025). Thus, the aggregate representation of the price setting, wage setting and aspiration-setting behaviours of capitalists and workers are necessarily indicative.

The stylised representation of the mechanism of price and wage setting is the following and is built along the lines of Morlin & Pariboni (2024). The change in the real wage of workers (w_t) is determined by the following factors. The term α_1 represents the extent to which workers can push for wage increases to keep track with inflation at times t (π_t). The term α_2 accounts for the capacity of workers to increase their money-wages to account the difference between their their actual (ω_t) and desired (ω_w) wage share as in (Morlin & Pariboni, 2024 or Nah & Lavoie, 2019):

(17) $$\hat{w}_t = \alpha_1 \pi_t + \alpha_2(\omega_w - \omega_t)$$

Workers target a given wage share as a function of unemployment. Meaning that for lower levels of unemployment, workers' bargaining power will be higher. Furthermore, numerous institutional factors determine the capacity of workers to target a sufficient wage share. These may include the strength and dynamism of trade unions, the existence of minimum wage legislation and other factors of structural power of the working class. This can be expressed as follows:

(18) $$\omega_w = \theta_0 - \theta_1 u_t$$

Where θ_0 expresses institutional, political, cultural and social factors which determine the working classes' bargaining power, and $\theta_1$reflects the sensitivity of the targeted wage share to unemployment.

The capitalists' claims are a key determinant of the final level of inflation at times t. Key factors in this sense are the capitalists' capacity to pass on increased labour costs (λ_1), their structural capacity to pass on increased costs of strategically significant inputs ($\hat{i}_t$), and their aspiration gap, with desired share of income expressed as ω_k. As stated above, inflation is also influenced by structural shocks to the supply-side of the economy: shocks to capital, labour productivity or the labour force may reduce supply to levels below expected. As previously mentioned, this is expressed by the term δ_t.

The inflation rate can thus be expressed in the following manner:

(19) $$\pi_t = \lambda_1(\hat{w}_t) + \lambda_2(\hat{i}_t) + \lambda_3\delta_t + \lambda_4(\omega_t - \omega_k)$$

Finally, this paper proposes that the income share of capitalists is expressed as a function of the institutional power of the capitalist class, which may include the strength of trade associations, political capture, minimum wage regulations, the level of financialisation etc., expressed as ψ_0 and by the consolidation of the market k_t, meaning that greater market consolidation increases capitalists' abilities to increase the amount of income they appropriate.

(20) $$\omega_k = \psi_0 + \psi_1 k_t$$

3. Equilibrium positions

The equilibrium rate of unemployment is calculated in absence of any changes in distribution and stable climate conditions. This means that the growth rate settles at the rate of growth of autonomous demand $g_y = g_z$. Also, the change in the unemployment rate settles at $\hat{u} = 0$, the change in the wage share would settle at $\dot{\omega} = 0$. Capacity utilisation would converge to the normal level ($\mu_t = \mu_n$). Furthermore, in equilibrium, stable conditions imply that there is no mismatch between supply and demand due to climate-induced disruption. For this reason, $\delta_t = 0$ Substituting into (16) equilibrium unemployment is:

(21) $$u^* = \frac{\beta_o + g_A - g_Z}{\beta_1}$$

with $u^* > 0$ and thus: $\beta_o + g_A > g_Z$

We observe that if exogenous growth of the labour force (β_o), and labour productivity growth (g_A) were lower due to climate conditions, the equilibrium rate of unemployment would be higher.

The propensity to invest, in equilibrium conditions, from manipulating eq. (15), would settle at:

(22) $$h^* = \frac{[g_z + d']v}{\mu_t^*}$$

In this case, it must be noted that a higher replacement cost of capital (d') results in higher propensity to invest. This is to be expected as, within the flexible accelerator mechanism, investment increases to match aggregate demand. Higher investment costs for a given level of aggregate demand would result in higher propensity to invest.

Finally, the equilibrium wage share is obtained from equations (17) and (19), considering that, in equilibrium, the nominal wage increases at the same rate as prices. In this case it means that $\hat{w}_t = \pi_t$. Furthermore, we substitute the workers' target wage share (ω_w) with eq. (18).
The equilibrium wage share thus becomes:

$$(23) \qquad \omega^* = \frac{\alpha_2(\theta_0-\theta_1 u^*)(1-\lambda_1-\lambda_2)+\omega_k\lambda_4(1-\alpha_1)}{\lambda_4(\alpha_1-1)+\alpha_2(1-\lambda_1-\lambda_2)}$$

We can see that for an increase in the weight that systemically significant prices (λ_2) on inflation, the equilibrium wage would not be affected. This is to be expected when considering the fact that, within a conflicting claims framework, the determinants of the wage are related to the structural power of the different classes. The equilibrium wage, in fact, is a weighted average of the distributional target of both capitalists and workers (Morlin & Pariboni, 2024), accounting also for the prices of strategically significant inputs.
In conclusion, the equilibrium inflation rate, on the other hand, is expressed as follows:

$$(24) \qquad \pi^* = \frac{\alpha_2\lambda_4(\theta_0-\theta_1 u^*-\omega_k)}{\alpha_2(1-\lambda_1-\lambda_2)+\lambda_4(1-\alpha_1)}$$

We note that, equilibrium inflation will be higher in the case of higher capacity of the capitalist class to pass on price increases (λ_1), for higher structural power of working classes (leading to higher wage indexation, α_1), but also for higher weight of the prices of strategically significant inputs within the determination of inflation (λ_2). As in Morlin & Pariboni (2024), eq. 24 can be manipulated to represent a non-accelerationist Philipps curve.

The analysis of equilibrium conditions yields interesting results. Yet, the analysis of a how representation of how a destabilised climate system interacts with the political economy to generate inflation. For this reason, the analysis of out of equilibrium dynamics of the model through numerical simulations can yield more interesting insights.

4. Simulations of out of equilibrium dynamics

Two different kinds of simulations were carried out: one is based on the application of a time-constrained climate shock (Scenario 4), whilst the other explores the effects or permanent climate pressure on the model, more consistent with a pattern of increasing destabilisation of the climate system (Scenario 5). The first type of scenario is dubbed "climate shock", whilst the second

is dubbed “climate change”. A few caveats on the nature of the simulations themselves are necessary before analysing the results. First of all, the economy analysed is theoretical in magnitude, with most of the parameters being based on literary consensus. The climate parameters, on the other hand, are grounded on plausible, literature-based, estimates, which are explained in the appendix. The shocks to the supply-side, and in particular those to capital, labour productivity, and the labour force, can tentatively be connected to a scenario similar to “business as usual”, or around 3° of warming (RCP 6.0). Nevertheless, the force of the shocks connected to these variables should be considered to be plausible in scope rather than exact, and thus interpreted as such. The only case for which the entity of the shock is more theoretical than based on existing literature, is that of the shock to systematically significant inputs, where a significant literary gap remains. The impact of the shock to systemically significant prices is of a 30% increase under the climate change scenario and a 60% increase in the “severe climate shock” scenario. The most important results from the simulations were the following: climate shocks to supply cause persistent inflationary pressures, which are more pronounced if the working class is able to better defend its purchasing power.
The scenarios carried out were the following:

- Scenario 1: shock to all of the single parameters on the supply-side, useful to compare magnitudes and study the properties of the model.
- Scenario 2: a severe combined shock to all the parameters on the supply-side with baseline (Scenario 2a) and strong (Scenario 2b) labour force structural power;
- Scenario 3: a severe shock to systemically significant prices with baseline (Scenario 3a) and with strong labour (Scenario 3b) bargaining power;
- Scenario 4: “climate shock” scenario with severe shock to all of the parameters with baseline (Scenario 4a) and strong (Scenario 4b) labour bargaining power
- Scenario 5: “climate change” scenario with baseline labour bargaining power (Scenario 5a) and with strong labour bargaining power (Scenario 5b);

Table 1. Simulations

Variable affected	Symbol	Baseline	Climate pressure	Climate shock*
Exogenous growth rate of the labour force	β_0	0.037	0.034	0.0328
Climate damage to labour productivity	ξ_{At}	0.01	0.031	0.0434
Climate damage to capital	ξ_{kt}	0.5	3.7	5.18
Systemically significant input	*pi*	1	1.3	1.6

*the climate shock for β_0, $\xi_{At}\xi_{Kt}$ parameters is a 40% increase to the baseline shock .

4.1 - Scenario 1: shock to individual components

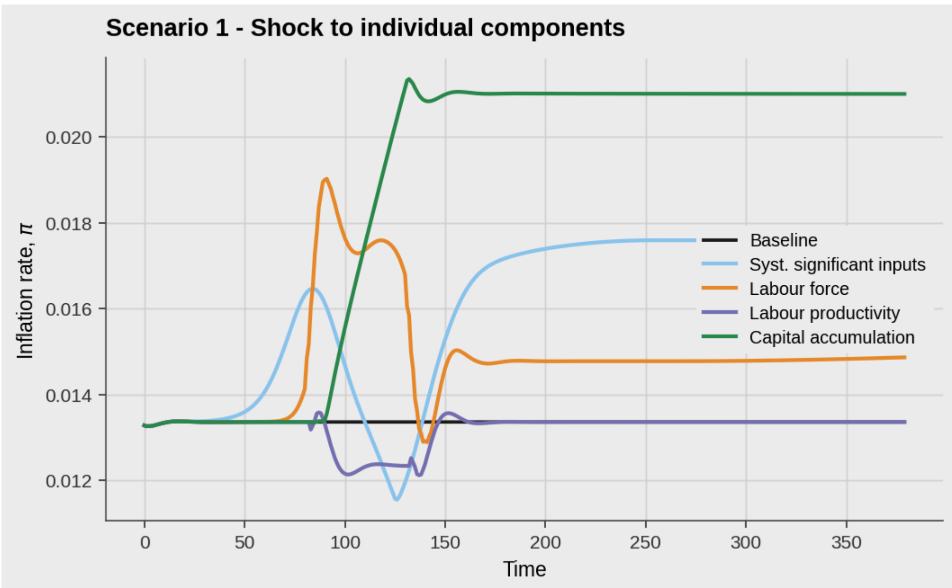

Fig. 1: Baseline inflation plotted vs. shock to β_0, $\xi_{At}\xi_{Kt}$, *pi*

Scenario 1 depicts the effect of shocks applied to the various climate feed-in mechanisms the model accounts for. What can immediately be observed is that the shocks generate persistence in the inflationary episodes. The cause of the persistence in the shocks is the δ term present in equation (19), which describes inflationary pressure arising from situations where supply falls below the levels which would be ordinarily attained by a demand led regime. We can observe in Figures 2 and

3 that, by introducing a 5% threshold in the difference between demand and supply for causing inflation (Fig. 2) or by simply setting $\delta = 0$ the inflationary pressures respectively decrease or dissipate entirely.

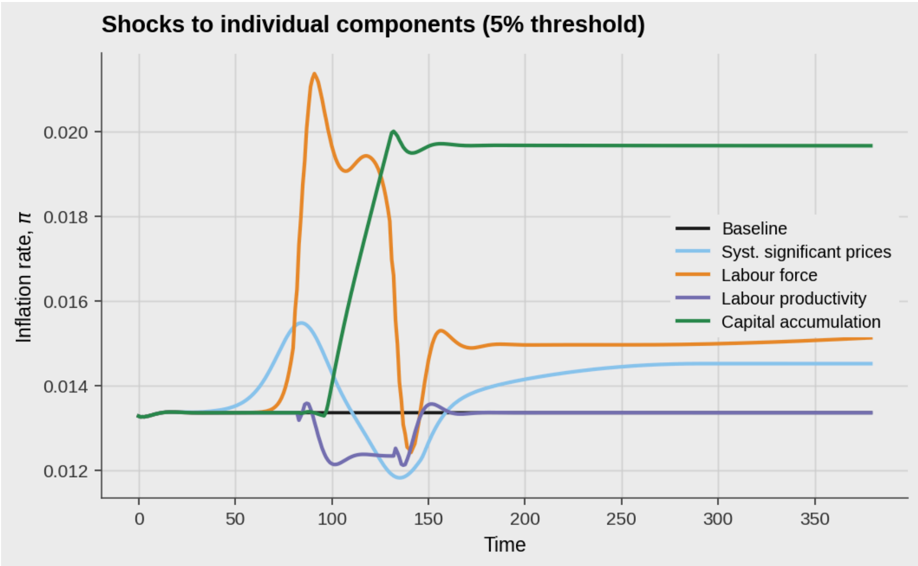

Fig. 2: Baseline inflation plotted vs. shock to components with 5% threshold for δ

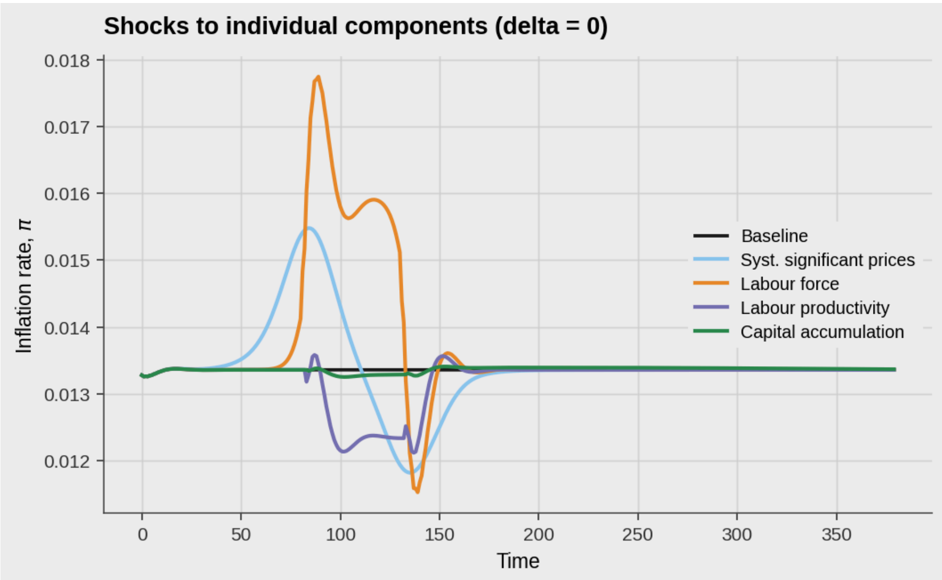

Fig. 3: Baseline inflation plotted vs. shock to components with $\delta = 0$

The reason for this is twofold: one the one hand it is due to the convergence behaviour of the Sraffian Supermultiplier when shocked, and on the other it is due to what can be described as a "productivity-enhanced labour force constraint". In other words, when shocked, the Supermultiplier (representing the demand-side in this model) tends to converge back to equilibrium through cycles of decreasing intensity, as can be observed in Figure 11 in the Appendix. During these cycles, capacity utilisation (which drives propensity to invest, as in eq. 10) tends to increase above its normal level and then decrease below it in a cyclical manner, before stabilising back at its normal level (and thus settling the rate of growth at that of the autonomous component of demand[4]). This dynamic interacts with the supply-side of the economy, which is depicted by a Leontief function (eq. 4) where the growth rate of supply does not follow the same "overshoot" dynamics, but returns to the growth rate of the steady state faster (guided in this by eq. 3 and eq. 4). This means that supply may lag slightly below demand after a sustained shock. Now, as can be observed in Fig. 2, the entity of this lag is substantial enough to cause demand to outpace supply by at least 5% in the case of shocks to the labour force (which actually causes the greatest inflationary spike), and for the shock to capital accumulation. These characteristics of the model need to be accounted for when interpreting the results of the simulations below. Some of the dynamics observed are perhaps more representative of the structure of the equations themselves rather than dynamics one would observe in the real economy. Nevertheless, these dynamics do shed light into the complexity of the interaction between demand and supply in the real economy under destabilising conditions, such as those created by climate change. This said, these dynamics, even after accounting for the structural characteristics of the model, do fall in line with the persistently higher inflation which is theorised by Michell (2023), Weber & Schulken (2024), and Jackson et. al, (2026).

[4] For the purpose of these papers, the autonomous component of demand, which represents all non-capacity generating investment (Serrano, 1995), including government expenditure, real estate investment, and finance, is not contracted (or expanded) by the climate shock. The equilibrium growth rate of the economy thus remains not altered.

4.2 - Scenarios 2 and 3: shocks to the supply side and to systemically significant prices

Scenarios 2 and 3 depict the behaviour of the theoretical economy when affected by a 50 period shock, respectively to the supply components of the economy ($\beta_0, \xi_{At}\xi_{Kt}$) and to systemically significant inputs (p_i). The shocks are carried out under two scenarios where the working classes have lower (baseline) and stronger levels of structural power within the political economy (following the dynamics plotted out in eq. , 16, 17 and 18) . In the baseline shock, the workers do not have sufficient strength to recover their losses ($\alpha_1 < 1$), whilst in the "strong labour force" scenario they are able to do so ($\alpha_1 = 1.00$).

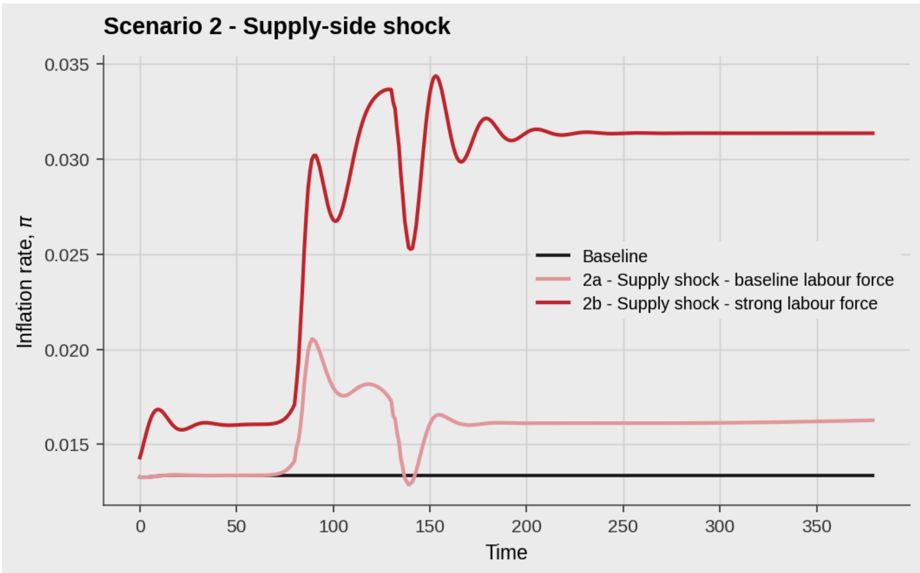

Fig. 4: Baseline inflation plotted vs. Scenario 2 ($\beta_0, \xi_{At}\xi_{Kt}$)with baseline and strong labour force

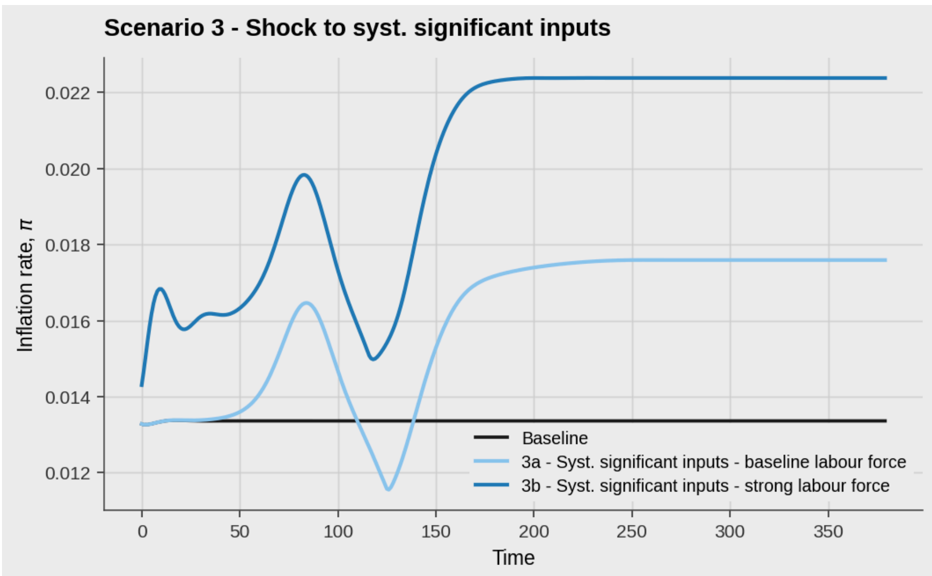

Fig. 5 Baseline inflation plotted vs. Scenario 3 (p_i)with baseline (3a) and strong (3b) labour force

The two shocks scenarios are carried out separately, as this is useful to observe the difference in magnitudes between the two components of the shock to the economy: one related to supply disruption, and one related to a climate-related shock to systemically significant inputs. The persistence in inflation is observed as with Scenario 1. It must be noted that Scenario 3 relates to a price shock which is plotted by two logistic functions and peaks slightly before period 100 before plateauing after period 150, whilst the shocks to supply both occur as "clean breaks" at period 50. Generally speaking, and in line with conflict inflation literature (Morlin & Pariboni, 2024), it appears clear that the inflationary shocks play out very differently based on the structural power of the labour force. Particularly with regards to Scenario 3, where the logistic function starts growing immediately, one can observe quite a steep increase in inflation, as the working class manages to defend its purchasing power. Similarly, in Scenario 2, it appears clear how, when supply is shocked, the inflationary dynamics are much more severe where the structural power of the working class is stronger.

Lastly, from scenarios 2 and 3, it appears that the shocks to the supply components create more significant inflationary pressures compared to those to systemically significant prices (separate simulations carried out with a $p_i = 1.7$ and 2 confirm inflation at lower levels than the shocks to supply).

4.3 - Scenario 4: climate shock

Scenarios 4 and 5 are the most complete simulations, where all of the shock parameters of the model are activated. Scenario 4 depicts an intense climate shock applied for 50 time periods to all of the components of the model.

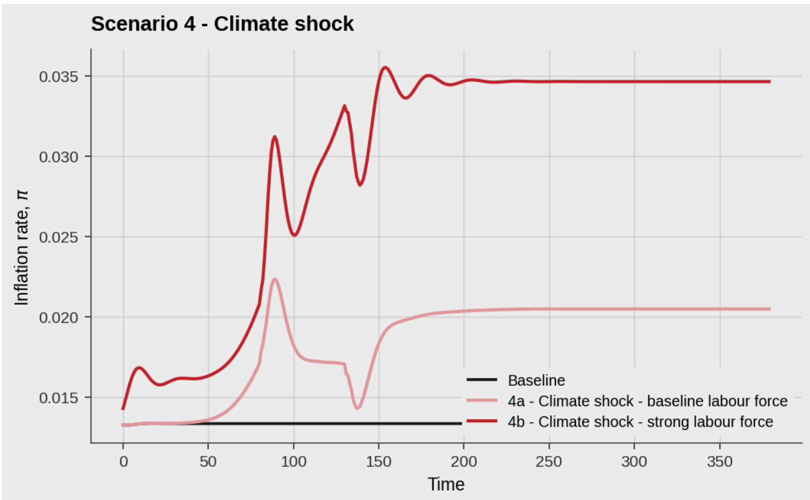

Fig. 6 Inflation rate plotted vs. baseline with strong (4b) and baseline (4a) labour force

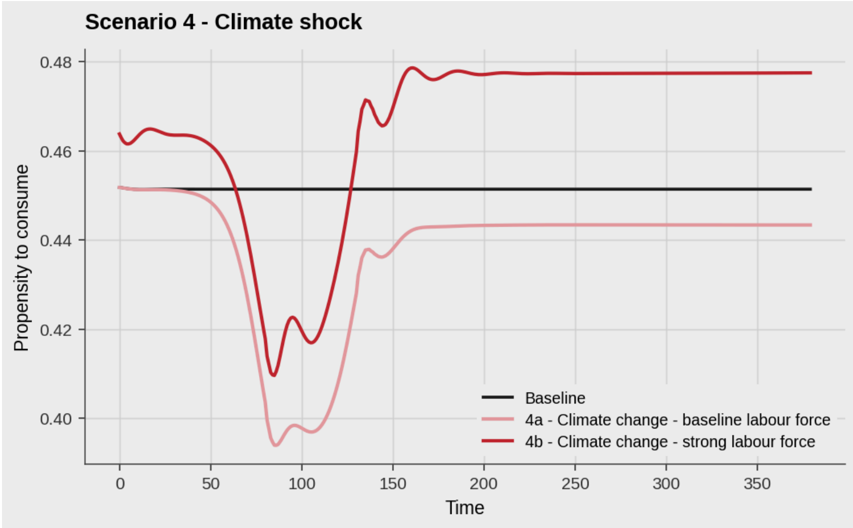

Fig. 7 Propensity to consume plotted vs. baseline with and strong and weak labour force

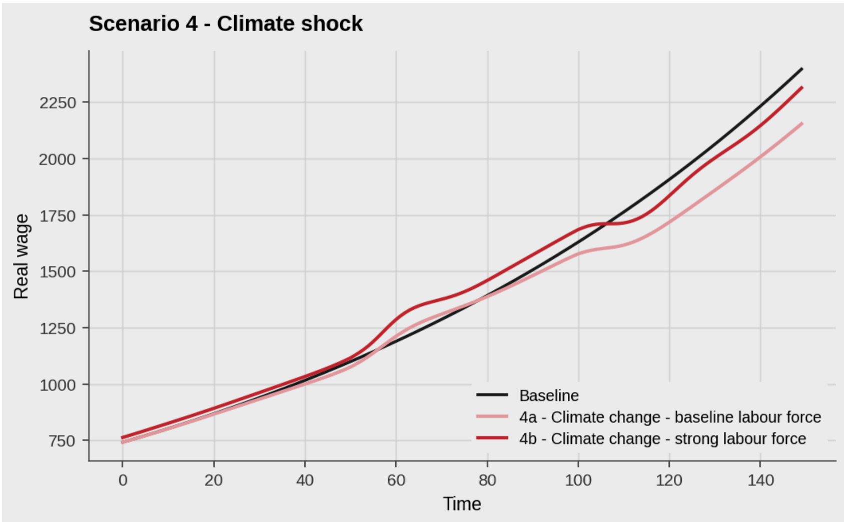

Fig. 8 Real wage plotted vs. baseline with and strong and weak labour force

We can observe that the combined influence of the shock produces severe inflationary pressures if the labour force is able to defend its purchasing power (at around 3.5%). A glance at distributional values helps us add nuance to the results on inflation. Fig. 6 plots the evolution of the propensity to consume (which is linearly connected to the wage share's purchasing power, seen in eq. 8). We can observe that in the weaker labour force scenario, the propensity to consume drops to levels below those of the baseline, and is thus permanently impacted by the transient shock, whilst, if the labour force has sufficient structural power, the propensity to consume may even increase. This said, in the long run this does not translate directly to an improved real wage compared to the baseline: during the shock, the combined effect of strong structural power, and increased wage claims (due to shrinking unemployment caused by an increase in the propensity to invest) pushes wages temporarily above baseline levels, but they fall below the equilibrium level as unemployment increases.

Scenario 5 - climate pressure

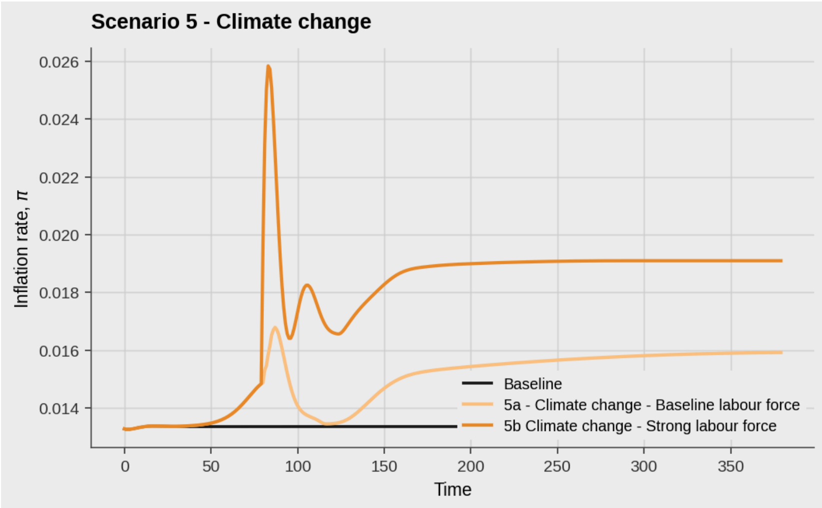

Fig. 8 Baseline inflation plotted vs. Scenario 5 with baseline (5a) and strong (5b) labour force

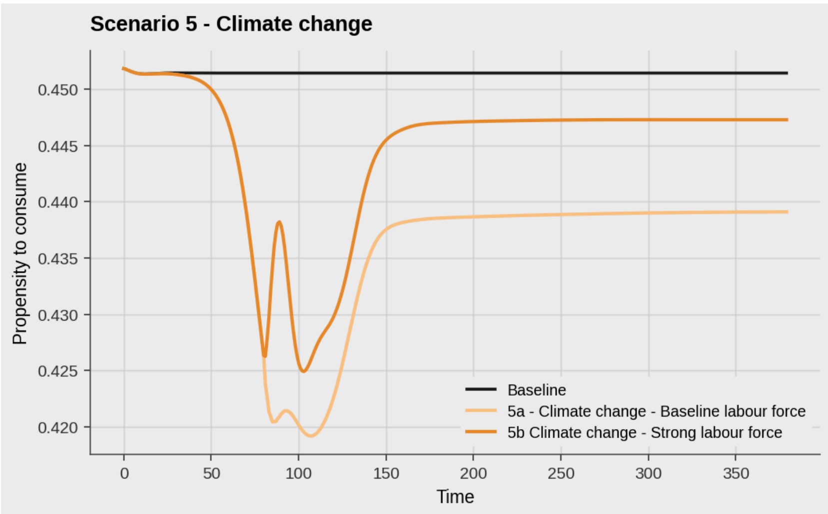

Fig. 9 Evolution of the propensity to consume with baseline and strong labour force

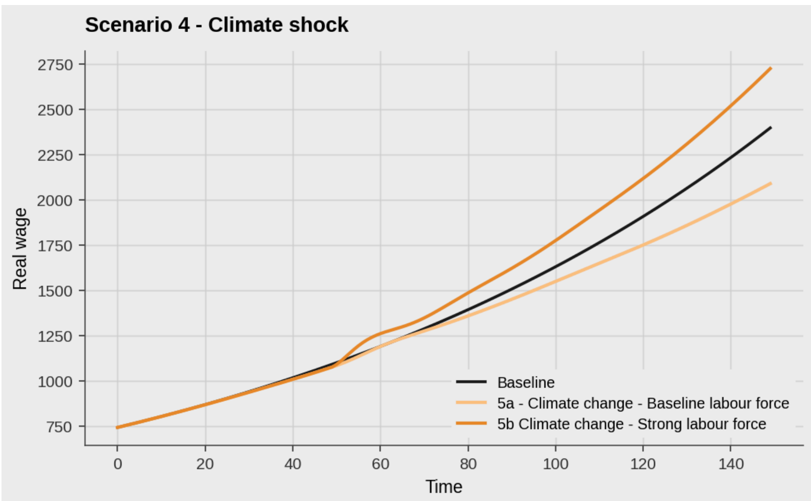

Fig. 10 Baseline real wage plotted against the climate change scenario with baseline and strong labour force

The final scenario under consideration is dubbed climate pressure. Under this scenario, the feed-in parameters from the climate system to the macroeconomy are shocked starting from period 100 with the intensities derived from literature and contained in Table 1. The inflationary pressure starts to show up at around period 50 due to the logistic function which represents the systemically significant price growth. It must be noted that this scenario is a limited depiction of what a more accurate climate pressure dynamic would entail. In particular, what is clear from climate science literature is that the interaction between the climate system and the macroeconomy is non-linear. In other words, alongside oscillating constant pressures, the economy under consideration would have to be subjected to shocks of varying kind, and severeness, but increasing frequency. Yet the scenario does hold interesting insights. As with the other cases taken under consideration, the result is a persistent inflationary pressure which becomes more severe with higher structural power of the working class. In this case, stronger structural power of the workforce is insufficient to permanently recover the baseline propensity to consume, as continuous climate damage leads to a higher propensity to invest (capital is destroyed) and prices of systemically significant inputs. This said, in this scenario, if the working class is able to defend all of its purchasing power, it can realise real wage gains, albeit at the expense of higher inflation and lower profit rates.
Finally, whilst it is true that the this last scenario produces less severe inflation compared to the limited, but more intense, shocks carried out in Scenarios 2 and 3, “Climate Pressure” is the only case where inflationary pressures persist even when the $\delta = 0$ (which means that it persists even when discarding the effect of supply lagging behind demand). The stability of the inflationary shocks and the ability of the economy to progress around a steady state is, again, the result of the self-stabilising and compensating mechanisms which characterise the Supermultiplier. Yet, like in the other cases the results are quite clear: climate shocks feed into the macroeconomy and generate inflationary pressures, and the class with less structural power within the economy will bear most of the brunt of the shock.

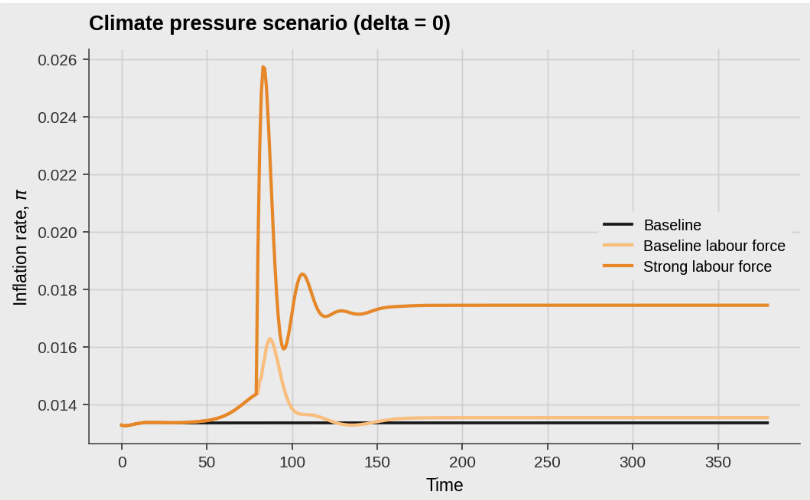

Fig.10 Baseline inflation plotted vs. Scenario 3 $(p_i)$with baseline and strong labour force

5. Conclusion

The model presented in this paper aims to bridge a significant gap in economic literature, and analyse the relationship between climate destabilisation and inflation. It does so by drawing on Ecological and Post-keynesian insights, and embeds a Classical Keynesian growth model with climate-related dynamics, to show that inflation is a key transmission mechanism from the environment to the macroeconomy. This model attempts to render, and can account for, a plethora of different ways in which the political economy will be impacted by climate change: from capital destruction, to capital depreciation. From labour productivity losses to migration and mortality affecting the labour force. A central part of this analysis relates to the prices of certain key inputs, those of the strategically significant kind, which play an outsized role in the propagation of inflationary dynamics. As is typical in the Post-Keynesian tradition, inflation is an inherently conflictual phenomenon, where the structural power of the capitalist and working class determine who bears most of the brunt of the shocks. This is particularly relevant when considering the policy implications of climate-induced inflation. In contrast to publications from Environmental economics, this model sheds light into the supply-side nature of the climate-induced inflationary phenomena. The preponderance of these mechanisms in determining inflationary dynamics, makes evident how inflation governance cannot be solely delegated to demand management and monetary policy solutions. This is especially true when considering the distributional implications of such shocks: the class with less structural power will be more greatly impacted, and monetary solutions are profoundly regressive in nature. The logical consequence of this is that a more holistic approach should be taken into consideration. Weber & Schulken (2024) trace an important outline of what this could look like; price stabilisation should include both short-term shock absorption measures such as buffer stocks of strategic goods and windfall profit taxes, but also more structural measures, including energy market reforms, reform of intermediary markets (such as wholesalers), supply-chain diversification, measures for agricultural adaptation, and water management. This said, there is little escape from the reality of our changing climate system, and long-term destabilisation of our economies is to be expected. The crucial debate should be on how to better prepare and plan for an unstable future where questions of scarcity in key inputs, of unstable and degrading ecosystemic services, and of increasing disruption to our means of production will be inevitable. On this final point, Ecological Economics has an important role to play and plenty of salient and increasingly important research avenues are open.

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Appendix

Simulation parameters and initial values

For the entity of the shock parameters under consideration, the approach adopted is that of attempting to translate relevant scientific literature into a reasonable estimate of the climate impact. As stated beforehand, the parameters are estimated to account for a "current trends" scenario, where global warming settles at around 3° by 2100 (around the RPC 6.0 Scenario). For the simulation of a 50 period shock to productivity, consistent with a period of particularly harsh temperatures, unstable precipitation patterns etc., we consider this term to grow by 40%.

Demography

The demographic equation of this model combines factors related to mortality, fertility, and migration all into one parameter (β_0). It must be stated that the dynamics of these three components of the parameters will differ significantly by country or region under consideration. Bressler, (2021), finds an increase of about 2% increase in mortality rates at the levels of warming related to the RPC scenario, which would increase death rates from around 0.7% (World Bank, 2024) to 0.714%. This estimate only considers heat-related deaths and discards other extreme weather and disease related mortality rates. Similarly, Barreca et. al, (2021), utilising data from the United States, find that within a business as usual scenario, birth rates could decline by 2.6% by the year 2100. Hajdu (2024), finds a 0.45% drop in birth rates connected to heat exposure in the EU. Considering a middle ground measure of 1.5% (drop), and a global current birth rate of 1.6%, this would reduce birth rates to 1.57%. Migration relating to climate change will also be significant, with the World Bank (2021) projecting that 216 million people could migrate from various regions of the Global South by 2050. Clearly, these dynamics will be very country and region specific, but the entities of the phenomena above appear to signify relatively small yearly changes. Considering that β_0 is calibrated to a 0.037, and considering the rough calculations above, when inferring a climate scenario with an outflow of population, it would be reasonable to see a relative drop to 0.034 (corresponding to a 0,3% drop in the growth rate of the labour force).

Labour productivity

The estimates on labour productivity losses are based on Dagsputa et. al, (2021). They conduct an empirical multi-model study on the state of the art of the literature published up until 2021, and find a highly heterogeneous effect of global warming on labour productivity. Under a 3° scenario of warming, they find a combined effect of warming on low-exposure sectors of around 18% and of 24.8% in high-exposure sectors. When calculating the losses implied by Dagsputa et. al, (2021) as a yearly average level of productivity, utilising an average between high and low exposure sectors (losses of 21.25%), and considering these losses to be attained by the year 2100 with baseline year 2025:

$rate\ of\ damage\ =\ (78,75/100)^{1/75}-1\ =\ 0.0031$ which con sidering $\rho_4\ =\ 0.1$ means $\xi_A =\ 0.031$

Capital destruction

The model's steady state rate of capital accumulation stands at 2% growth, which is consistent with the steady-state rate of growth expressed by. The initial value of d' is 0.02, and thus the $\left(\frac{h_t}{v_t}\right)\mu_t$ term is equal to 0.04. The initial capital stock of the economy is equal to 150.000, which after 75 periods of ss growth would be equal to 662.375. The literature on the climate effects on fixed capital accumulation is quite scarce, with Casey et. al, (2024) finding a 5.4% reduction in gross fixed capital accumulation by 2200, although they mostly focus on sectors such as consumption. Generally speaking, estimates on decreased growth rates due to climate change under 3° of warming fluctuate widely. For this paper, the estimates used by Waidelich et. al, (2024), who combine projections of climate models with empirical dose–response functions, are used as a baseline scenario. They find a 10% reduction in GDP for 3° of warming by 2100. I extrapolate this rough measure from growth of capital, by setting the ξ_K parameter to reduce capital growth by 2100 by 10%, or reducing gk to 0.0184. This would entail d' to be equal to 0.02161 and thus from the formula for calculating $d', n\ =\ 46.3$, and $\xi_K\ =\ 3.7$. Within the model

Simulation parameters and initial values

Symbol	Description	Value	Remarks
ϕ	Linear relationship between wage share and propensity to consume	0.95	Constant
c	Propensity to consume	0.45	Calculated from ss in line with rage in Post-Keynesian literature
γ	Constant parameter relating propensity to invest changes in capacity utilisation	0.4	Constant
h	Propensity to invest	0.049	Calculated from ss values
i	Propensity to import systemically significant goods	0.147	Rough estimate from EU import data
m	Propensity to import non syst.	0.265	Rough estimate from EU import

	significant goods		data
σ	Supermultiplier	1.1	Calculated from ss values
μ_n	Normal rate of capacity utilisation	0.85	Standard in Post-keynesian literature
α_1	Capacity of workers to keep adapt wage growth to inflation	0.6	Adopted considering the weakness of wage catch up in advanced economies.
α_2	Nominal wage reactivity to difference in wage share and workers' income share	0.6	Constant
θ_0	Institutional and political factors determining workers' wage objective	0.5	Assuming workers aim for a wage share of 0.5
θ_1	Sensitivity of workers' claims to level of unemployment	0.5	Constant
ω^w	Workers' income share objective	0.475	Calculated from ss
ψ_0	Institutional and political factors determining capitalists' wage objective	0.38	Assuming workers aim for a wage share of 0.38
ψ_1	Sensitivity of capitalists' claims to level of unemployment	0.1	Constant
mk	Measure of market concentration	0.6	$0 < mk < 1$ in the model it slowly grows from 0.6 to 0.7
ω^k	Capitalists' income share objective	0.44	Calculated from ss
ω	Wage share	0.475	
λ_1	Capitalists' capacity to pass on wage growth to inflation	0.8	Assuming capitalists' pass through 60% of increases in costs from nominal wage growth
λ_2	Inflation feed-in from increases in prices of systemically significant inputs	0.04	Constant
λ_3	Inflationary effect of shocks to supply	0.1	Constant
λ_4	Inflationary effects from changes in capitalists' income share objectives	0.2	Constant
$pm,\ qxm$	Price of non-syst. significant import and its quantity	1	Constant for calculating CPI
$px,\ qxt$	Price of good produced by the economy and its quantity	1	Constant for calculating CPI

cpi	Consumption price index	1 to	Utilised for calculating the real wage
τ	Measure of the purchasing power of wages	1 to 0.7	Real wage divided by nominal wage
gn	Growth rate of labour force	0.012	Calculated at ss
β_1	Reactivity of labour force growth to the level of unemployment	0.5	Constant
ρ_0	Exogenous growth rate of labour productivity	0.009	Calibrated constant in line with reasonable value
ρ_1	Labour productivity reaction to the level of unemployment	0.04	Constant
ρ_2	Labour productivity reaction to the installation of new capital	0.1	Constant
ρ_3	Labour productivity reaction to climate shocks	0.1	Constant
$ga,\ A$	Growth rate of labour productivity and labour productivity	0.083, 10.53	Calculated from ss values
ζ	Reactivity of the change of the rate of unemployment to discrepancies between labour supply and demand	0.4	Constant
r	Past growth rate of capital	0.02	Constant calibrated to the steady state
n'	Expected lifespan of capital stock	50	Variable susceptible to changes from climate factors
$o',\ o$	Expected speed of obsolescence of capital and actual speed of obsolescence	3	Variable susceptible to changes from climate factors (measured in reduction of expected lifespan)
$\xi_{kt}',\ \xi_{kt}$	Expected climate damage to capital and actual climate damage to capital	1	Variable susceptible to changes from climate factors (measured in reduction of expected lifespan)
d'	Amortisation cost of capital	0.02	Initialised from ss values
v	Capital output ratio	1.5	Constant in rage accepted by Post-keynesian literature
$K,\ gk$	Capital stock and its growth rate	0.02	Growth rate derived from ss gz
$Z,\ gz$	Aut. component of demand and its growth rate	0.02	Assumed 2% growth rate of Z.
u, U	Unemployment rate and nr. of unemployed	0.05	Assumed 5% unemployment at ss.

Y, Yd, Ys	Output, demand-led output, supply-side output	100000	
$N,\ E$	Labour force and total nr. of employed	100, 95	

Convergence dynamics of the Supermultiplier

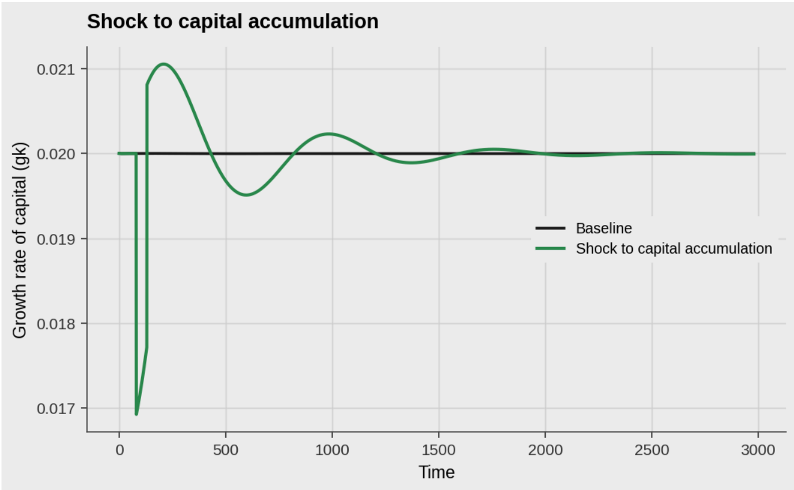

Figure 11 - Convergence back to equilibrium is observed after a shock to capital

Sensitivity analysis

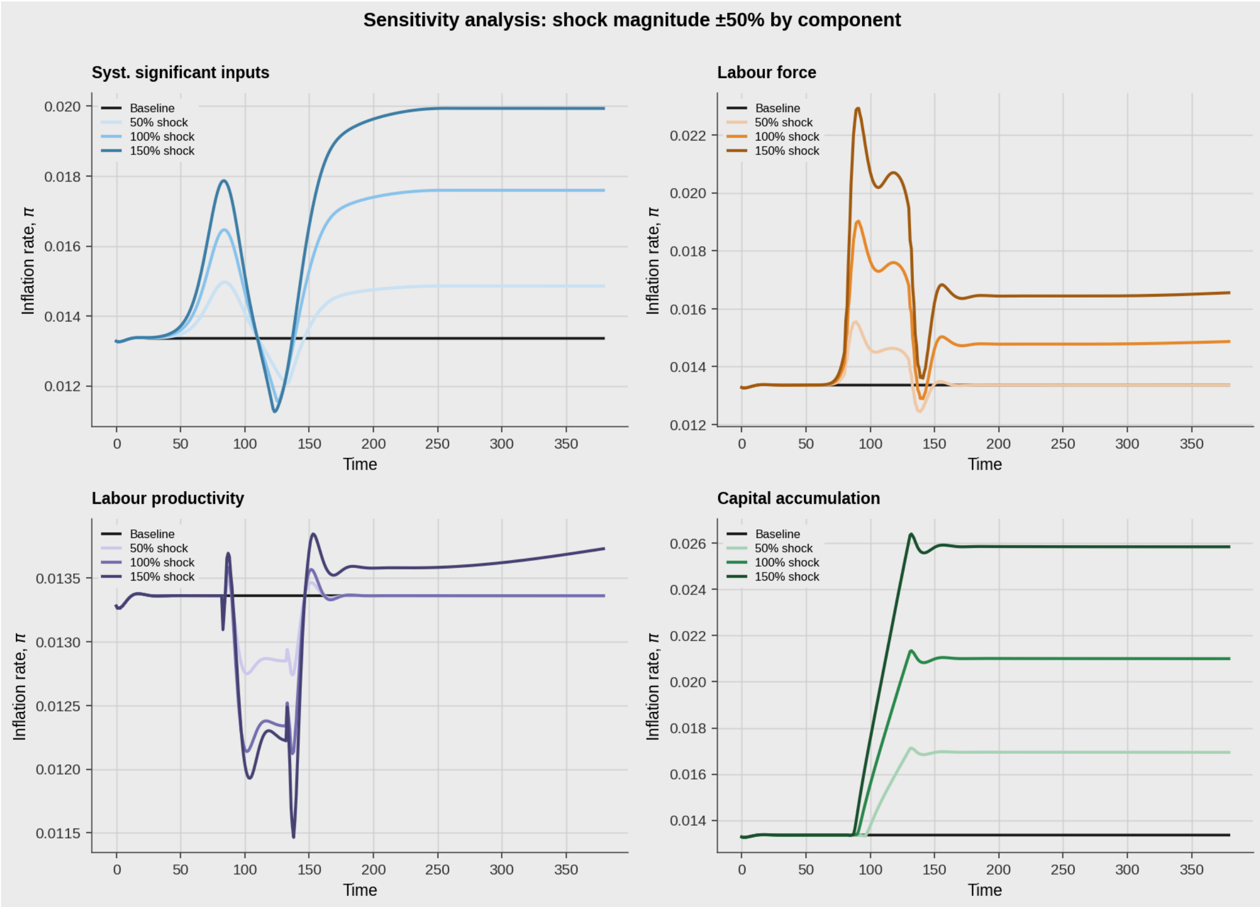

Figure 12 - Sensitivity analysis

Across all four channels, inflation responds monotonically to shock size. Larger disturbances produce larger and, in most cases, permanent deviations from baseline, confirming the model's sensitivity results are not driven by an arbitrary parameter choice. The capital and labour-force channels show the largest and most persistent effects, with capital accumulation shocks alone shifting long-run inflation by roughly 0.5–1.2 percentage points depending on magnitude.

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