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Original Article

Back to fiscal rules: The insanity of normality, unless the rich pay for it!

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Abstract

With central banks and national governments returning to more conservative monetary and fiscal policies after Covid, the debate about the macroeconomic effects of fiscal rules has revamped. We address this topic via an extended version of the hybrid ABM-SFC model in Botta et al. (2024) that includes a Taylor-type monetary policy rule and a variety of fiscal rules aimed at reducing the public debt-to-GDP ratio. We compare spending-based fiscal rules vastly advocated by international economic institutions with wealth tax-based fiscal policies. We do this in the context of a modern financialized economy where securitization and complex financial products like Asset-Backed Securities (ABS) alter economic dynamics and the effectiveness of monetary policy in controlling inflation. We assume heterogeneous households to track how alternative fiscal strategies affect income and wealth inequality. Our findings are threefold. First, spending-based fiscal rules can reduce the debt-to-GDP ratio in the long term but at the cost of significantly higher unemployment and permanently lower real GDP. Second, wealth tax-based fiscal policies reduce public debt without harming economic performance. Third, perhaps unexpectedly, in a financialized economy, spending-based fiscal austerity may hurt the relative position of rich households in wealth distribution as much as a wealth tax does; this is due to capital losses that spending cuts may eventually induce in households' financial wealth. In the end, wealth taxes are preferable to spending cuts, and the usual political opposition against them by the rich appears largely unfounded given their potential economic benefits compared to spending-based fiscal austerity.

Keywords: Securitization; spending-based fiscal rule; wealth tax
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1. Introduction

In the last decade or so, extraordinary policy measures have been taken to tackle equally exceptional shocks. Central banks first adopted quantitative easing in response to the 2007-2008 financial shock, and then revamped it in 2020 in order to back fiscal policy actions against Covid. The governments of most developed countries ran unprecedented budget deficits during the pandemic. Fiscal policy rules were suspended everywhere. Record inflation rates since the 1970s finally prompted a sudden and abrupt tightening of monetary policy in 2022. The end of the pandemic and the slowdown of inflation now seem to pave the way for the return to *normality*. Whilst central banks seem to consider more accommodating monetary policy stances in the near future (Lane, 2024), fiscal rules are on their way back as guiding principles of fiscal policy (Caselli et al., 2022).

History never repeats itself though, and normality does not look identical to what was before. On the one hand, most countries worldwide now record substantially higher stocks of public debt (with respect to GDP) as lasting consequence of the above-mentioned shocks. International economic institutions do believe that "long-term government debt trajectories pose the biggest threat to macroeconomic and financial stability" (BIS, 2024, p.62), and that safeguarding the sustainability of public debt is the upmost priority of policy makers. New revised EU fiscal rules have been actually adopted to this end. Among other changes, net *primary* government spending now stands as benchmark control variable to stabilize and hopefully reduce the public debt. On the other hand, income and wealth inequality worsened even further during pandemic after a secular rise since the beginning of the 1980s (Saez and Zucman, 2020; Saez and Zucman, 2022). The launch of the international "Tax the rich" campaign now makes the quest for the introduction of a wealth tax over the wealthiest more compelling than ever.[1]

In this paper, we study this "new" normal. More specifically, we analyze the different macroeconomic implications of different fiscal policies aiming at stabilizing (reducing) the public debt that are either focused on the control of public spending or inspired by the need of tackling unacceptably high inequality via wealth taxation. We do this by comparing two alternative fiscal policy strategies. On the one hand, consistent with suggestions by the IMF (Eyraud et al., 2018) and with the recently reformed EU Stability and Growth Pact (SGP)—see Darvas et al. (2024)—we consider fiscal policy centered on managing, possibly cutting, net *primary* public spending as the main way to achieve fiscal targets (i.e., a reduction in public debt and a deficit-to-GDP ratio below 3 percent). On the other hand, we consider the alternative option of a wealth tax levied on financial assets held by narrower or wider sets of households in the economy. We conduct such comparison in the context of an extended version of the hybrid ABM-SFC model presented in Botta et al. (2024), where the assumption of heterogeneous households allows us to track the effects of such different fiscal choices over income and wealth inequality, among other variables.

The outcomes of our simulations are qualitative in nature and are not meant to reproduce real data or forecast the evolution of any specific economy. Nor our model is intended to formalize the full intricacy of existing fiscal rules. Nonetheless, our analysis may shed light on some complex effects of the interaction between monetary policy and different types of fiscal adjustments, whilst capturing the in-depth economic philosophies of such alternative fiscal strategies themselves. Three main results are worth stressing.

First, spending-based fiscal rules come at the cost of lower growth (if not recession) and higher unemployment. Due to damages to the real economy, they are self-defeating in the short run, as they cause the debt-to-GDP ratio to rise initially. The debt-to-GDP ratio stabilizes and eventually decreases in the medium-to-long run only. This happens thanks to fiscal policy interaction with more accommodating monetary policy stances that are allowed by lower inflation rates.

Second, an alternative wealth tax-based fiscal policy may equally preserve the sustainability of public budget without detrimental effects over growth and employment. The stabilization and reduction in the debt-to-GDP ratio actually takes place more promptly than in the case of spending cuts.

Third, the outcome of the two policies in terms of wealth inequality are, to a certain extent, unexpected. On the one hand, both a wealth tax on the top 10 percent wealthiest households and public spending cuts determine a decrease in wealth inequality. The mechanisms at work are radically different though. While in the former case, it is a plain matter of wealth redistribution, in the second case the recession triggered by lower public spending increases the number of non-performing loans. This in turn causes the value of the financial assets held by wealthy households to drop due to capital losses on securitized loans underneath structured financial products. On the other hand, a universal application of the wealth tax, regardless of wealth percentiles, allows

[1] See https://www.tax-the-rich.eu on this. See also Guzzardi et al. (2024) advocating the introduction of a wealth tax in Italy in order to correct existing regressive taxation at the top of the income distribution.

to maintain the relative distributive position of the richest, while obtaining the desired results in terms of public finances. This is because it preserves economic dynamics and the accumulation of wealth even at the top of wealth distribution by avoiding the contractionary effects of spending cuts.

All in all, our results suggest that the introduction of a wealth tax may be preferable than public spending cuts in order to improve the sustainability of public debt. And contrary to widespread political aversion against wealth tax, its introduction may actually be in the self-interest of the rich if it helps to avoid negative consequences for the value of securitized loans incorporated in complex financial products that wealthy households increasingly purchase on financial markets in largely financialized economies.

The paper is organized as follows. Section 2 makes a brief review of most recent developments in advanced economies as to public debt sustainability and fiscal rules, as well as wealth inequality and connected taxation. Section 3 presents the main features of our hybrid ABM-SFC model and of the economy is meant to describe. Section 4 illustrates the main outcomes of our simulations. Section 5 draws some policy implications and discusses areas for future research. Section 6 concludes.

2. Post-Covid advanced economies' macroeconomy: some stylized facts

Two aspects of advanced economies' macroeconomy have grasped considerable attention in the current economic debate. On the one hand, the issue of public debt sustainability and fiscal consolidation is marked in red on the agenda of policymakers and international economic institutions. On the other hand, several academics and think tanks keep stressing historically high levels of income inequality and wealth concentration characterizing such economies.

As to the first point, most developed countries present substantially higher stocks of public debt than what was recorded at the beginning of the 2000s. Tougher debt burdens are the long-lasting consequences of bold policy interventions taken in response to the 2007–2008 financial shock first and, more recently, to the economic disruptions caused by Covid. In this context, international economic institutions now wonder whether governments still have any fiscal space left to tackle future shocks. They raise increasing concern about the sustainability of public debt in a possibly less favorable economic scenario featuring the progressive slowdown in post-Covid economic dynamism (i.e., lower nominal GDP growth rate) and considerably higher interest rates with respect to the low-for-long interest rate environment of the 2010s. Credible, vigorous, and prolonged fiscal tightening is the suggested recipe against risks posed by previous fiscal slippages. The Bank for International Settlements, for instance, bluntly states in its 2023 annual report that "there is urgent need to consolidate fiscal positions" (BIS, 2023, p.69). In a similar vein, the IMF claims that "durable fiscal consolidation efforts are needed to safeguard sustainable public finances and rebuild buffers in a context of slowing medium-term growth prospects and high real interest rates" (IMF, 2024, p.xi).

When it comes to inequality, increased income inequality and wealth concentration are not a new feature of developed countries. They are the outcome of a secular rising trend that, since the beginning of the 1980s, has brought back inequality standards close to historically high levels recorded in the first decade of the previous century (Piketty, 2014; Piketty et al., 2018). What is new is that Covid seems to have exacerbated inequality even further with a jump in the degree of wealth concentration at the very top of the distribution, at least in the United States (Saez and Zucman, 2022). Extremely high inequality records may obviously raise some moral issues. More importantly for the present analysis, they may also pose some threats to the well-functioning of the economy. For instance, several economists have identified increased inequality as a possible source of permanent slack in aggregate demand, excess savings, and, eventually, secular stagnation (Summers, 2015; Eggertsson et al., 2019; Palagi et al., 2023).

These two seemingly unrelated features of modern advanced economies are actually united by a very relevant point: they both bear important implications in terms of the conduction of fiscal policy. On the one hand, the above-mentioned international economic institutions and most mainstream economists shape their quest for fiscal consolidation in the form of a return to fiscal rules. After being suspended during Covid, the revamp of fiscal rules should introduce some relevant changes though. Reforms should be oriented to make fiscal rules simpler, more flexible, and, at the same time, more enforceable. A cornerstone aspect of suggested novelties is the adoption of a public spending rule as the unique operational rule for the implication of fiscal policy[2]. This is actually part of the revised EU SGP agreed by EU Member States in April 2024. The economic rationale behind this principle is fairly simple. Governments should pursue their (medium-term) fiscal targets by primarily managing their *net primary* spending. These are spending that governments can directly control and that are computed net of interest payments and cyclical components such as unemployment benefits. In such an amended fiscal framework, fiscal consolidation and projected reductions in the public debt burden would be achieved via slower growth, if not straight cuts, of net primary public spending with respect to GDP growth. On the other hand, rising wealth concentration has induced consensus among a wide range of economists and public opinion, even amongst wealthy people,[3] about the need of introducing a tax on wealth. The "Tax the rich" campaign recently launched in Europe is a clear example of such spreading demand. Saez and Zucman (2022) document wealth taxes introduced in the United States and in some European countries in the past. They stress the little contribution such taxes gave to overall fiscal revenues due to generous exemptions, large avoidance, or vast evasion by taxpayers. They simulate the introduction of a 1 percent progressive wealth tax on top 1 percent wealthiest tax units. According to their estimations, revenues could be up to about 1 percent of GDP in some European countries, and even more in the case of the United States. Saez and Zucman (2022) do not discuss how governments should deploy the revenues of the wealth tax. Nonetheless, they can certainly contribute to the reduction of accumulated debt. In a similar way, Kapeller et al. (2021) suggest that funds raised via the introduction of a European wealth tax should provide finance for post-Covid recovery and the green transition. The financing of policies against climate change will constitute a tremendous challenge for fiscal solidity. The proposed wealth tax may surely help to tackle it and improve fiscal balance's sustainability.

In this paper, we analyze the macroeconomic implications of these two different, albeit not necessarily incompatible, fiscal strategies. We compare the outcomes of a spending-based fiscal rule aiming at keeping the fiscal balance under control (below the 3 percent deficit-to-GDP threshold) and, this way, reducing the debt-to-GDP ratio, with respect to the effects of a wealth tax on the wealthiest households (see more on this below). We carry out our study in the context of a *financialized* advanced economy. Financialization is described as an economy featuring a fairly complex financial system that produces complex financial products (i.e., Asset-Backed Securities—ABS) by using securitized loans extended by commercial banks to households and non-financial firms as "intermediate inputs". Very importantly, such financial mechanisms do create an implicit connection between different layers of income and wealth distribution. The debt of low-middle income households, originated by commercial banks and then sold and put off their balance sheet via securitization, become part of financial assets possibly purchased by wealthier households (via holdings of invest funds' shares). In a way, our goal is to study the complex macroeconomic, financial, and distributional consequences of the above-mentioned alternative fiscal policies once we take into due account how financialization jointly influences the functioning of the economy (by affecting inflation dynamics and, hence, central bank's monetary policy stance, for instance—see Botta et al. (2024)), as well as distributive records.

We conduct our analysis by means of an extended version of the hybrid AB-SFC model by Botta et al. (2022); Botta et al. (2024) that now includes, among other aspects (more details are provided in section 3 below), a richer description of the interaction between monetary and fiscal rules. In this regard, our work contributes to a stream of research in the agent-based literature that has already investigated the macroeconomic effects of fiscal rules and fiscal austerity in the context of complex AB models (Dosi et al., 2013; Dosi et al., 2015; Caiani et al., 2018; Teglio

[2] The adoption of a public spending rule is expected to improve the enforcement of fiscal rules by making them hinged upon a well-defined macro variable, which is openly observable and measurable. This is in stark contrast with fiscal rules previously centered around the cyclically adjusted (or structural) public balance, i.e., a quite abstract theoretical concept that is not observable in the data and that must be computed through debatable techniques and assumptions. Attention paid to public spending net of interest payments and cyclical outlays would also allow automatic stabilizers to operate in full and fiscal policy to remain counter-cyclical in the event of severe negative economic shocks

[3] This is the case, for instance, of the so-called "Millionaires for humanity". See https://millionairesforhumanity.org about this.

et al., 2019). Our study extends the analysis carried out in such contributions in several ways. First, in those papers fiscal austerity was modeled as either cuts to unemployment benefits (Dosi et al., 2013; Dosi et al., 2015)), or cuts to universal public transfers to households (Caiani et al. (2018)), or, alternatively, as increasing income taxes (Teglio et al., 2019). In our model, we try to better capture the "philosophy" of suggested newly revised fiscal rules that identify cut in primary *non-cyclical* public spending as the main tool of fiscal consolidation. In this paper, we model the implementation of "new" fiscal rules in the form of cuts to public purchases of goods and services. Second, we compare the outcomes of spending-based fiscal rules with the effects of the introduction of a wealth tax. Third, we shed light on the implications of such alternative fiscal policy plans on *personal* income distribution on top of functional one[4]. Fourth, and connected to the previous point, we conduct our analysis in the context of a fairly complex financialized economy, where both non-financial firms and households may take loans from banks, and households may receive various types of income (interest income and dividends on top of labor income) by investing in complex financial products.

Important for the sake of our analysis, we neglect to consider the housing sector in our model. We do so for two reasons. First, given the quite high degree of complexity characterizing the financial side of our simulated economy, this assumption keeps the model more tractable and understandable without altering its rationale. Second, and perhaps more relevantly, our analysis focuses on the macroeconomic effects of the introduction of a *wealth* tax. Consistent with Saez and Zucman (2022), this should not be wrongly misunderstood as a *property* tax. Indeed, property taxes already exist in most advanced economies and target, albeit with very large exemptions, *non-financial* wealth, namely houses. What Saez and Zucman (2022) advise (among many others), and we try to model, is the imposition of a tax on *financial* wealth (holdings of stocks, bonds or investment funds' shares, for instance), for which track records about implementation and proceeds are much more limited.[5] In the end, our decision not to formalize the housing sector is fully consistent with our primary attention given to the taxation of financial wealth.

3. The model

The model builds upon Botta et al. (2022); Botta et al. (2024). It is an *hybrid* Agent-Based-Stock-Flow-Consistent (AB-SFC) model that includes one heterogeneous sector—there are $\bar{N}$ heterogeneous households—and six aggregate sectors: *commercial banks, special purpose vehicles* (SPV), *investment funds* (IF), *non-financial firms*, the *government*, and the *central bank*. Nonetheless, we extend previous versions of our model in several directions. First, we explicitly model households' defaults on borrowed money whenever they are unable to meet loan installments. This point captures a very relevant aspect of a financialized economy, where the debt of some households, and their ability to repay it, influences the value of the financial assets held by other households (via securitization, the production of ABSs, and the purchase of IFs' shares). Indeed, the outbreak and propagation of the 2007-2008 financial shock were triggered by indebted low-middle income households defaulting on risky loans packaged into complex financial products massively sold to investment institutions such as hedge funds (Lysandrou, 2012; Goda and Lysandrou, 2014). Second, and perhaps more importantly for our study, we embed in our model a more detailed description of monetary and, above all, fiscal policy. Monetary policy is modeled as a fairly standard Taylor rule, according to which the central bank changes its policy rate (and, hence, the cost of credit in the economy) in order to control inflation dynamics. Fiscal policy, instead, is modeled in a variety of different ways according to whether the stabilization

[4] Dosi et al. (2013); Dosi et al. (2015) focus on functional income distribution instead. They model households as pure working households that receive labor income only, consume it all, and do not carry out any form of saving and wealth accumulation. Profits are fully retained by non-financial firms and banks, the former being the only private actor in the economy being indebted towards the banking sector

[5] The much narrower history of tax on financial wealth is somehow due to its misconception as property tax and the quite widespread unpopularity of the latter as a consequence of possible liquidity issue it may cause. Wealthy people have frequently and successfully lobbied against the introduction of the former by leveraging general political aversion towards property taxes.

Table 1. Aggregate balance sheet

	Households	Banks	SPV	IF	Firms	Gov	Total
Deposits	$+D_H$	$-D$		$+D_{IF}$	$+D_F$		0
Capital					$+K$		$+K$
Shares	$+Sh$			$-Sh$			0
Bonds		$+B_B$		$+B_{IF}$		$-B$	0
Loans	$-Lh$	$+(1-z)L$	$+zL$		$-Lf$		0
Derivatives			$-ABS$	$+ABS$			0
Own Funds	$+OF$	$-OF_B$			$-OF_F$		0

of public debt and fiscal sustainability are pursued via the implementation of a spending-based fiscal rule or through the introduction of a wealth tax.

As usual in the SFC approach, the structure of the economy and the interconnection between its different sectors is grasped by a set of accounting matrices: the *aggregate balance sheet*, which portrays the stocks of assets at the beginning of every period (Table 1); the *transaction flow matrix*, showing all the monetary flows (Table 2); the *revaluation matrix*, which accounts for changes in asset values not determined by new flows (Table 3). Consistent with the description of monetary policy as a fairly simple (policy) interest rate setting by the central bank (see section 3.2), the central bank itself does not appear in the above-mentioned matrices as it does not hold any asset or liability. Conversely, SPVs are portrayed in the matrices but they will not appear in section 3.2, where behavioral equations are discussed. Indeed, this sector is conceived as a passive pass-through, which purchases a portion (z) of the loans (L) granted by commercial banks to households and non-financial firms. These loans are then securitized, transformed into ABSs, and sold to IFs. The size of (z) is endogenously determined by IFs' demand for ABSs. This is the core of the *securitizing system* as reproduced in our model. Next to ABSs, IFs' portfolio choice includes deposits (D) and public bonds (B). To finance their investment, IFs will issue shares bought by households. We will go through the remaining elements of the accounting matrices while presenting the timeline of events.

3.1 Timeline of the events

1. The level of production is set by the non-financial firm sector. Firms decide how much to produce by adjusting previous period desired production in light of the observed gap between demand and desired supply. Actual production is defined according to a Leontief production function.
2. Once production plans are defined, firms determine employment. Nominal wages come next. They are set according to a Philips curve-type process. The dynamics of employment and of wage inflation jointly determine the total wage bill (W).
3. Prices (hence inflation) are defined according to a mark-up pricing rule on total variable costs including labor and financial costs.
4. Employed households receive wages and pay taxes on it, while those unemployed receive a dole from the government.
5. Financial payments take place. These include:
   (a) Interests on previous period households' and firms' loans, both securitized (e.g. $i^{h}_{t-1} \cdot z \cdot Lh_{t-1}$) and non-securitized (e.g. $i^{h}_{t-1} \cdot (1-z) \cdot Lh_{t-1}$);
   (b) Repayment of a fixed portion (ϵ) of loans' principals. This, together with the new inflow of credit, will determine the change in the stock of loans of both households (ΔLh) and non-financial firms (ΔLf);
   (c) Returns on ABSs ($f_{t-1}ABS_{t-1}$), equal to interests paid on the fraction z of loans securitized and bundled in such financial products;
   (d) Interests on previous periods stock of public bonds (e.g. $ib_{t-1} \cdot B_{B,t-1}$);
   (e) Returns on IFs' shares ($r^{sh}_{t-1}Sh_{t-1}$), which are equal to all interests received by IFs on their assets;

Table 2. Aggregate transaction flow matrix

	Households	Banks		SPV		IF		Firms		Govt.	Σ
		CA	KA	CA	KA	CA	KA	CA	KA		
Consumption	$-C$							$+C$			0
Publ. Exp.								$+G$		$-G$	0
Investment								$+I$	$-I$		0
Wages	$+W$							$-W$			0
Dole	$+Do$									$-Do$	0
Taxes	$-T_H$	$-T_B$						$-T_F$		$+T$	0
Int. on Loans	$-i^{b}_{t-1}Lh_{t-1}$	$+i_{t-1}(1-z)L_{t-1}$		$+i_{t-1}zL_{t-1}$				$-i^{f}_{t-1}Lf_{t-1}$			0
Ret. on Deriv.				$-r^{abs}_{t-1}ABS_{t-1}$		$+r^{abs}_{t-1}ABS_{t-1}$					0
Ret. on Shares	$+r^{sh}_{t-1}Sh_{t-1}$					$-r^{sh}_{t-1}Sh_{t-1}$					0
Int. on Bonds		$+ib_{t-1}B_B, t-1$				$+ib_{t-1}B_{IF,t-1}$				$-ib_{t-1}B$	
Dividends	$+Div_{t-1}$	$-Div_{B,t-1}$						$-Div_{F,t-1}$			0
Profits		$-\Pi_B$	$+\Pi_B$					$-\Pi_F$	$+\Pi_F$		0
Change in the stocks of											
Deposits	$-\Delta D_H$		$+\Delta D$				$-\Delta D_{IF}$		$-\Delta D_F$		0
Loans	$+\Delta Lh$		$-\Delta(1-z)L$		$-\Delta zL$				$+\Delta Lf$		0
Derivatives					$+\Delta ABS$		$-\Delta ABS$				0
Shares	$-\Delta Sh$						$+\Delta Sh$				0
Bonds			$-\Delta B_B$				$-\Delta B_{IF}$			$+\Delta B$	0
Loan Defaults	$+NPL$		$-NPL$								0
Δ Total	0	0	0	0	0	0	0	0	0	0	0

Table 3. Revaluation matrix

	Households	Banks	SPV	IF	Firms	Gov	Total
Own Funds	$+\Delta OF$	$-\Delta OF_B$			$-\Delta OF_F$		0

(f) Dividends (Div_{t-1}) set aside by non-financial firms and commercial banks at the end of the previous period and distributed to households in proportion to their wealth at the beginning of the current one.

6 Households may default. This happens when the sum of disposable income and previous period deposit stock does not cover the (exogenously-set) level of subsistence consumption plus installment (i.e., interest and principal payments) on accumulated debt stock. When the borrower defaults, the portion of debt not repaid is computed as non-performing loan (*NPL*).

7 At macro level, *NPL*s are computed as the sum of missing principals. They have numerous consequences:
   (a) Insolvent households are cut off from credit for the next four periods as a consequence of "shaky" credit history from creditors' perspective.
   (b) Capital losses, determined by missing principal repayments, are passed onto the balance sheets of IFs and commercial banks according to the proportion of securitized (z) and non-securitized loans ($1\text{-}z$). In IFs portfolio this translates into a loss in the value of ABS.
   (c) On the liability side, for IFs, the value of their shares (Sh) diminishes by the same amount of capital losses registered on ABSs. In the case of commercial banks, their fraction of non-performing loans is eventually matched by an equal reduction in banks' Own Funds (OF_B). In both cases, capital losses are eventually suffered by households holding financial wealth (either IF shares or bank equities).
   (d) Returns on ABSs and, therefore, IF shares also decrease by the amount of missing interest payments on securitized loans.
   (e) When securitized loans are repaid instead, maturing loans are converted into IFs' deposits.

8 Households set their desired level of consumption and financial assets' holdings (deposits and shares), hence defining their demand for credit.

9 Credit market: commercial banks set the borrower-specific interest rates for individual households and for non-financial firms, and decide whether to fully accommodate households' credit demand.

10 If credit is rationed, households revise their plans through a pecking order process. They first scale down their demand and, if needed, their holding of shares; they then do the same with deposits; eventually they cut consumption to a minimum subsistence level.

11 Public expenditure and investment take place: the government purchases goods from non-financial firms, which in turn purchase capital goods from themselves.

12 The goods market: the goods market clears. Goods are assumed as perishable. In case of excess supply, excess production wipes out. In the case of excess demand, the rationing is proportional to individual components of aggregate demand.

13 Government collects taxes and, if needed, issues bonds to finance the public deficit.

14 Financial assets: IFs purchase ABSs and public bonds, the latter being bought also by commercial banks.

15 Commercial banks set the amount of retained earnings based on their capital needs.

16 The central bank sets the policy rate according to an *inertial* Taylor rule aimed at stabilizing inflation.

3.2 The equations

A complete list of equations can be found in the appendix B. Here, we present key behavioral choices. The suffices i and t define individual households and the simulation period throughout all the model, respectively.[6] Asterisks are used to identify all quantities whose original value may differ from what is eventually set, as in the case of desired or target levels.

3.2.1 Non-financial firms

Non-financial firms is an aggregate sector that uses capital and labor to produce a single good for both consumption and investment purposes according to a Leontief production function. Given our focus on macro dynamics that emerge from real sector's interaction with a fairly complex financial sector, we voluntarily keep the real sector of the economy as simple as possible. For instance, we neglect to consider technological and innovation phenomena that typically characterize K+S agent-based models à la Dosi et al. (2010). Moreover, for the sake of simplicity, we do not consider inventories. Possible excess supply (with respect to aggregate demand) is taken into account by firms in the revision of their production plans and in the definition of profit margins over average total costs though.

The first set of equations describing the behavior of the non-financial firm sector concerns the choice of the production level, and with it, the level of employment. Firms decide how much to produce (Equation (1)) updating previous period desired level of production according to two elements: (i) the distance between previous period desired levels of supply ($Y^*_{S,t-1}$) and aggregate demand ($Y^*_{D,t-1}$); (ii) an exogenous growth component (υ_2). The first element endogenizes firms' (desired) production plans by making them dependent on the evolution of aggregate demand, hence on possible credit or (self-imposed) fiscal constraints to consumption, investment and public expenditures. In line with the post-Keynesian literature (Lavoie, 2014), parameter (υ_2), together with parameter (γ_1) in non-financial firms' investment function (see Equation (12) below), capture "Keynesian animal spirits" instead, i.e., non-financial firms "spontaneous urge to action rather than inaction (Keynes, 1936, p.161)" in the words of Keynes himself.

A production function à la Leontief determines the maximum level of production (Equation 4) according to available productive inputs and corresponding productivity. (K_{t-1}) is installed capital stock and ($\bar{N}$) is the total labor force. (X^K) and (X^L_t) stand for capital and labor productivity, respectively. Firms will set the actual level of aggregate supply (Equation (5)) equal to the desired level, as determined in Equation 1, only if this does not exceed maximum production capacity. While capital productivity is fixed, labor productivity increases through time. The growth rate of labor productivity depends positively on the exogenous parameter χ^L_1, and on the observed growth rate of aggregate demand. This latter component captures a Kaldor-Verdoorn type effect (Equation (6)). It constitutes a further element of endogenous dynamics and interaction between demand and supply in the real side of the economy. Once set, the production level, divided by labor productivity (Equation (7)), determines employment. As we do not include part-time jobs, the result of Equation (6) is rounded down to the closer integer.

$$Y^*_S = [Y^*_{S,t-1} + \upsilon_1 \cdot (Y^*_{D,t-1} - Y^*_{S,t-1})] \cdot (1 + \upsilon_2) \tag{1}$$

$$Y^{MAX}_K = K_{t-1} \cdot \bar{X}^K \tag{2}$$

$$Y^{MAX}_L = \bar{N} \cdot X^L_t \tag{3}$$

$$Y^{MAX} = min(Y^{MAX}_K, Y^{MAX}_L) \tag{4}$$

[6] Whenever a household sector variable does not include the suffice *i*, it refers to the sector as a whole and its value is given by the sum of individual variables.

$$Y_S = \begin{cases} \text{if } Y_S^* \leq Y^{MAX} \Longrightarrow Y_S = Y_S^* \\ \text{if } Y_S^* > Y^{MAX} \Longrightarrow Y_S = Y^{MAX} \end{cases} \tag{5}$$

$$X_t^L = X_{t-1}^L \cdot \left[\chi_1^L + \chi_2^L \cdot \left(\frac{Y_{D,t}^*}{Y_{D,t-1}^*} - 1 \right) \right] \tag{6}$$

$$N_t = \frac{Y_S}{X_t^L} \tag{7}$$

The second group of firms' choices refers to prices and wages. Wage inflation, *i.e.* the rate of growth of the wage rate (see Equation (8)), is first linked to observed previous period price inflation (π_{t-1}). This term is meant to capture trade unions' attempt to maintain workers' purchasing power by tracking observed increases in prices at time *t-1*. The growth rate of nominal wages then depends negatively on the unemployment rate (un_t), according to a Phillips curve-type argument,[7] while it responds positively to increases in labor productivity via parameter ω_3. Equation (9) shows updates in the wage bill, which, next to wage inflation, also takes into account for changes in the employment level.

Once defined labor costs, non-financial firms set prices by applying a mark-up (μ_t) over average total costs. These are given by total costs, which include both the wage bill (W_t) and financial payments ($i_{t-1}^f \cdot L_{t-1}$), over supply (Equation (10)). The markup moves endogenously (see Equation (11)) once given a minimum acceptable value (μ_{MIN}) to which mark-up would asymptotically tend in the (hypothetical) event of an infinitely large excess supply. The markup increases (decreases) with previous period excess demand (supply).

$$\omega_t = (1 + \pi_{t-1}) \cdot \left[\frac{\omega_1}{(\omega_2 + un_t)} + \omega_3 \cdot \frac{X_t^L - X_{t-1}^L}{X_{t-1}^L} \right] \tag{8}$$

$$W_t = W_{t-1} \cdot \left[1 + \omega_t + \left(\frac{N_t}{N_{t-1}} - 1 \right) \right] \tag{9}$$

$$p_t = (1 + \mu_t) \cdot \left[\frac{W_t + i_{t-1}^f \cdot Lf_{t-1}}{Y_S} \right] \tag{10}$$

$$\mu_t = \mu_{MIN} + \mu_{t-1} \cdot \frac{Y_{D,t-1}^*}{Y_{S,t-1}}. \tag{11}$$

Finally, firms will take their investment decisions according to a pretty standard investment function in the post-Keynesian and Kaleckian literature (Bhaduri and Marglin, 1990; Hein, 2014; Lavoie, 2014). The desired rate of growth of real capital stock (Equation (12)) depends on three elements: (i) a positive autonomous component (γ_1)—as said, Keynesian "animal spirits" in investment decisions; (ii) previous period profit share; (iii) the distance between the actual and the exogenous *normal* (u_N) level of capacity utilization. Slacks (booms) in aggregate demand may

[7] Parameters ω_1 and ω_2 give the shape of such Phillips curve function.

thus influence firms' decisions to invest both via the profit-related argument in Equation (12), i.e., by depressing (boosting) firms' profitability, and via the so-called "accelerator" by reducing (raising) firms' capacity utilization with respect to its normal level. Firms finance their investment through retained profits, which are a fixed portion of net profit, and banks' loan (more on this in Section 3.2.4). Desired and realized investment may differ: whenever demand, given by the sum of the desired levels of consumption, investment, and public expenditure, exceeds supply, rationing takes place. Each component of aggregate demand, investment included, is reduced proportionally.

$$g_t^* = \gamma_1 + \gamma_2 \cdot \frac{\Pi_{t-1}}{Y_{t-1}} + \gamma_3 \cdot (u_{t-1} - u_N) \tag{12}$$

$$I_t^* = K_{t-1} \cdot g_t^* \tag{13}$$

$$K = K_{t-1} + I_t - \delta \cdot K_{t-1} \tag{14}$$

3.2.2 Households

The households sector is populated by $\bar{N}$ heterogeneous agents characterized by different levels of income, consumption, savings, wealth, and indebtedness. Only wage heterogeneity is imposed from the beginning, the other differences result from the functioning of the model. For instance, in the initialization of the model, wealth is equal to zero for all households. Wealth inequality then emerges as a result of household heterogeneity in terms of income, which translates into different savings, different access to credit, and therefore different financial investments and income.

Household disposable income (Equation (15)) consists of three entries. Households first receive a nominal wage $w_{i,t}$ if employed, or a dole paid by the government in case they are unemployed. Financial income accrues to households in the form of (i) interest receivables from IFs' shares eventually held at the beginning of the period ($r_{t-1}^{sh} Sh_{t-1} \cdot sh_{i,t-1}$); (ii) dividends ($Div_{i,t-1}$) from banks and non-financial firms. For the sake of simplicity, we do not explicitly model the equity market. We assume households own non-financial firms and commercial banks in proportion of their wealth, and that dividends are distributed accordingly. Outlays are taxes on income ($tax_{i,t}^{w}$), and "effective" interest payment. The latter is given by individual interest rate ($i_{i,t-1}^{h}$) times the previous period stock of debt (*i.e.* bank loan $Lh_{i,t-1}$). It is labeled "effective" and signaled by the tilde in (Equation (15)) as it is diminished by the part of due payments that households may not be able to meet.

$$yd_{i,t} = w_{i,t} - tax_{i,t}^{w} + r_{t-1}^{sh} Sh_{i,t-1} + Div_{i,t-1} - \widetilde{i_{i,t-1}^{h} \cdot Lh}_{i,t-1}. \tag{15}$$

In any period of time, the wage bill (see Section (3.2.1)) is distributed among employed households following a log-normal distribution set at the beginning of the simulations with log-standard deviation θ. Given the aggregate unemployment rate, the employment status of each household is set by a random draw.[8] This aims to capture the impact of unforeseen events, like transitory unemployment, which may impact disposable income.[9]

Taxation is progressive. There are two tax rates on income, with the higher applied to the part of wage exceeding a threshold (median wage). In one of the scenarios of the simulation,

[8] For the sake of simplicity, here we do not model the empirical evidence provided by Iacono and Ranaldi (2020) for the case of Norway, according to which the probability of being unemployed is higher for households at the bottom of wealth distribution.

[9] On the interaction between wage and income distribution, and on the impacts that securitization exerts on it, see Botta et al. (2021).

we introduced the possibility for the government to decide to introduce a tax on wealth above a certain exemption threshold or to a certain group of people (say households at the top of the income distribution) if needed to stabilize the public debt. Indebted households use their net income and accumulated stock of deposits to meet their financial commitments (i.e., interest payments and principal repayment), with the exception of the amount required for subsistence consumption, set as a portion of previous median consumption. Note that part of the financial income obtained on IFs' shares depends on ABSs that convey interest payments from indebted households to those having invested in IFs themselves. Households make default whenever what is left after covering subsistence consumption is not enough to meet expected installments fully. Principal that is not repaid therefore is registered as *non-performing loan* (NPL).

Desired consumption is computed according to a variety of factors. It first depends on the different components of disposable income $yd_{i,t}$: (c_w) is the propensity to consume out of net wage income $yw_{i,t}$; (c_r), instead, is the propensity to consume out of financial incomes, i.e., returns on IFs' share and distributed dividends. Consistent with the empirical findings by Onaran et al. (2011), as well as previous SFC models on inequality (see, for instance van Treeck, 2011; Detzer, 2018), this assumption captures different consumption (and hence saving) propensities out of wages and of financial income, the former being higher than the latter. Second, consistent with Caceres (2019) and De Bondt et al. (2019), desired consumption is also defined according to household propensity to consume out of (net) wealth. In equation (16), parameter (c_{wealth}), once multiplied for household net wealth $(NW_{i,t})$, captures such element in household consumption decisions. It also represents the main channel through which wealth taxation may affect aggregate demand and, hence, the dynamics of the economy (see more on this below). Last but not least, the social component of desired consumption, i.e., a sort of "keep up with the Joneses" argument, is given by a proportion (c_n) of previous period average consumption.

Two reasons may lead to the final level of consumption differing from what desired. First, commercial banks may ration credit (see more on this below). Second, if excess aggregate demand is recorded in the economy. In this latter event, each household will be forced to reduce its consumption by an amount proportional to its desired level as it will be in the case of all other components of aggregate demand.

$$c^*_{i,t} = c_w \cdot (yw_{i,t}) + c_r \cdot [r^{sh}_{t-1} Sh_{i,t-1} + Div_{i,t-1}] + c_{wealth} \cdot (NW_{i,t}) + c_n \cdot \bar{c}_{t-1}. \tag{16}$$

Once defined desired consumption (and savings), households set their desired stock of financial assets. Desired deposits (Equation (17)) are a fixed portion (η_H) of previous period individual wealth stock. The desired level of IFs shares is the result of an adaptive process: previous period individual stock of shares is adjusted according to the observed difference between the returns on the shares issued by investment funds $(rsh_{i,t-1}/Sh_{i,t-1})$ and the cost of external financing $(i^h_{i,t-1})$ for indebted households.[10] Demand for loans (Equation (19)) eventually results from the difference between the desired flows of financial assets and desired/planned saving (S^*)[11], as given by disposable income minus desired consumption (Equation (19)).

$$Dh^*_{i,t} = \eta_H \cdot Wh_{i,t-1} \tag{17}$$

$$Sh^*_{i,t} = Sh_{i,t-1} \cdot [1 + \sigma(\frac{r^{sh}_{t-1} Sh_{i,t-1}}{Sh_{i,t-1}} - i^h_{i,t-1})] \tag{18}$$

[10] This last component is zero for non-indebted households.

[11] On the one hand, this assumption is consistent with available empirical evidence about the relevance of consumption credit for low-middle income households in increasingly unequal societies (see Cynamon and Fazzari (2008) among many others). On the other hand, it also captures more "speculative" intents from high middle income households (see Albanesi et al. (2022)), who can decide to apply for banks' loans, and then invest borrowed funds in financial markets (i.e., purchase IFs' shares), whenever financial returns become more attractive (i.e., during periods of rising interest rates). See also Botta et al. (2024) on this.

$$\Delta Lh^*_{i,t} = \Delta Dh^*_{i,t} + \Delta Sh^*_{i,t} - S^*_{i,t}. \tag{19}$$

As mentioned above, whenever rationed, households revise their choices following a pecking order procedure. First, they reduce the expansion of shares and, then, deposits. If needed, financial assets' holding could also be diminished by, say, redeeming IFs shares. As last resort, households may reduce their consumption down to a minimum subsistence level (see Equation (B31) in the appendix for a more formalized representation of this point).

3.2.3 Government and the central bank

The public sector of the economy is composed by the government and the central bank. As said at the beginning of this paper, a central goal of our study is to analyze the complex interaction of such institutions in the conduction of their respective policies in the context of an advanced financialized economy. More specifically, simulations' results presented in section 4 will describe the macro-financial consequences of different fiscal strategies, namely spending-based fiscal rules or the introduction of a wealth tax, aimed at putting the dynamics of public debt-to-GDP ratio under control. We leave the detailed description of such alternative fiscal policies, and the way they interact with monetary policy, to section 4 itself. In this present section, instead, we present the "backbone" elements on which the implementation of monetary and, above all, fiscal policy do rest.

The government is responsible for social security and the implementation of fiscal policy. The former consists in the provision of a dole transferred to unemployed households. All unemployed households receive a public dole set equal to 75 percent of previous period lowest wage. Such unemployment benefit embodies the counter-cyclical component of public spending linked to the functioning of automatic stabilizers. As we will see in more details below, and consistent with (new) fiscal rules supported by international economic organizations and envisaged by the revised EU Stability and Growth Pact (SGP), this component of public spending will not be affected by any policy action meant to curtail fiscal outlays and stabilize (reduce) public debt. Beyond the functioning of automatic stabilizers, other sources of public spending and fiscal revenues are modeled as follows.

First, the government purchases goods to offer public services. Public purchases (Equation (20)) are modeled in the simplest way possible. They first revolve around their previous period's level through parameter ξ_1 in Equation (20). Parameter ξ_1 hence captures inter-temporal persistency in public purchases. Then, they are linked to private consumption through parameter ξ_2 that captures observed proportionality between public and private (consumption) demand injections in aggregate demand. Other way around, via parameter ξ_2, we model the relative size of public with respect to private consumption, and its relative stability compared to other more volatile components of aggregate demand (i.e., investment). As it will become clearer later on, we will model the implementation of spending-based fiscal rules and policy-makers' attempt of squeezing the relative size of the public sector with respect to the private economy by modifying the value of parameter ξ_2 itself.

Second, fiscal revenues arise from the collection of income taxes on income, commercial banks' and non-financial firms' profits ($\tau_\pi \cdot \Pi_t$). As said before, taxes on households' income are progressive, with different tax rates for (the part of) households' income that fall below or above the median one. As part of policy packages aimed at ensuring fiscal sustainability, the government could also introduce a tax (τ_i^{WH}) on households' wealth ($WH_{i,t}$)—more on this in section 4. If so, we assume the wealth tax will be collected automatically, at the beginning of each period, by deducing it from accumulated households deposits. As such, it does not contribute to determine disposable income, but it may certainly influence consumption choices via households' propensity to consume out of wealth (see 16).

$$G_t = \xi_1 \cdot G_{t-1} + (1 - \xi_1) \cdot \xi_2 \cdot C_t \tag{20}$$

$$T_t = \tau_\pi \cdot \Pi_t + \sum_{i=1}^{N} \tau_i^{w} w_{i,t} + \sum_{i=1}^{N} \tau_i^{WH} WH_{i,t-1} \tag{21}$$

$$\Delta GD_t = G_t + dole \cdot [\bar{N} - N_t] + i_{t-1}^{b} \cdot GD_{t-1} - T_t \tag{22}$$

$$i_t^b = i_{t-1}^T \cdot [1 + \alpha(\frac{B_{B,t}}{GD_t} - \frac{B_{B,t-1}}{GD_{t-1}})] \tag{23}$$

In the event a fiscal deficit should emerge, the government issues public bonds. They are purchased by IFs and commercial banks. The interest rate on public bonds is defined through a recursive mechanism (see Equation (23)) anchored to previous period policy rate. Starting from its previous period level (i_{t-1}^T), the interest rate on bond changes with the portion of debt purchased by commercial banks. Since commercial banks buy all the bonds not purchased by IFs, an increase in the share they hold proxies a lower demand for public securities and, as such, leads to a higher interest rate. Since a higher interest rate determines a higher demand by investment funds, a new round begins. The process comes to an end whenever the increase in interest rate, determined within a round, is below a threshold (ϕ). Interests paid on public debt stock obviously represent an additional source of spending by the government. They are not accounted in the primary balance though. As such, they will not be the target of any fiscal rule driving the implementation of fiscal policy.

The central bank is responsible for monetary policy instead. For the sake of simplicity, we model the conduction of monetary policy in the simplest way possible. The central bank sets its policy rate, which then serves as "anchor" for the determination of the other interest rates in the economy, with the aim of controlling inflation. It does so via the so-called "*inertial*" Taylor rule (see Woodford, 2003; Bernanke, 2004; Stein and Sunderam, 2018) as formalized in equation (24) below:[12]

$$i_t^T = \rho \cdot i_{t-1}^T + (1 - \rho) \cdot \{\pi_t + \rho_\pi \cdot [\pi_t - \pi^T]\}. \tag{24}$$

The first element in equation (24) captures, via parameter ρ, the degree of "gradualism" with which the central bank adjusts its policy rate from period to the next one.[13] The second element, instead, is related to the inflation threshold (π^T) set by the central bank itself. The higher current inflation (π_t) and its (positive) gap with respect to central bank's target, the more vigorously the central banks will revise upward its policy rate in comparison to the previous period.

The fairly simple representation of monetary policy provided by this model implies that the central bank does not hold assets (ex: advances to commercial banks) nor liabilities (commercial banks' reserves). It just establishes the policy rate. As such, the central bank does not appear in the balance sheet and transaction flow matrices reported in Tables 1 and 2, respectively.

3.2.4 Commercial banks

The aggregate banking sector plays a pivotal role in our model. On the one hand, through credit creation, it feeds both production and the purchases of consumption goods, investment goods,

[12] Following Stein and Sunderam (2018), equation (24) may well capture the *modus operandi* of most central banks, the US Federal Reserve first and foremost, when they effectively have to define their policy rate. This is the result of a weighted average between the lagged funds rate and some functions of the inflation gap, or of inflation and output gaps together.

[13] Bernanke (2004), in his description of the behavior of the FED, defines gradualism as the FED adjusting "interest rates incrementally, in a series of small or moderate steps in the same direction." We set the value of parameter ρ equal to 0.8. This in line with but slightly below the one (i.e., 0.85) traditionally associated to the FED (see, for instance, Coibion and Gorodnichenko, 2012), given current central banks' primary concern about tackling inflation and recent relatively swift changes in their policy rates.

and financial assets. On the other hand, through lending, it "supplies" the inputs for the securitization process and, hence, the production of ABSs (Lysandrou, 2011; Adrian and Ashcraft, 2012; Caverzasi et al., 2019). Moreover, it buys all the public bonds that remain unsold on financial markets (*i.e.,* that are not purchased by IFs).

The credit creation process is based on commercial banks' assessment of potential borrowers' creditworthiness. Credits to households may be rationed in the event of a negative evaluation by commercial banks' about households' financial solidity. Rationing takes place when households applying for new credit from commercial banks present track records of non-performing loans. We assume that, in the event households are unable to service their debt and declare default, they are excluded from new rounds of loans concession in the following four periods of simulation. Even without previous evidence of weak borrowing scores, households need to satisfy certain criteria in order to be eligible for commercial banks' loans. Commercial banks establish them as follows. Commercial banks first define the "*expected*" household-specific interest rate $i^{e,h}_{i,t}$. This is the interest rate each household might have to pay based on its demand for new loans (see Equation (25)). It is computed as a mark-up on the observed (i.e., previous period) central bank's policy rate (i^T_{t-1}). Through parameter (ι), the markup increases with the financial fragility of the borrower. This is proxied by the product between the observed policy rate (i^T_{t-1}) and the ratio between the new desired level of indebtedness—previous period stock ($Lh_{i,t-1}$) plus new desired loans ($\Delta Lh^*_{i,t}$)—and household's net income $yn_{i,t}$. Once defined $i^{e,h}_{i,t}$, $mh^*_{i,t}$ stands for the "*notional*" debt-service ratio each single household would bear in the event new loans were granted (see Equation (27)).

$$i^{e,h}_{i,t} = i^T_{t-1} + \iota_h \cdot i^T_{t-1} \cdot \frac{Lh_{i,t-1} + \Delta Lh^*_{i,t}}{yn_{i,t}} \tag{25}$$

$$i^f_t = i^T_{t-1} + \iota_f \cdot i^T_{t-1} \cdot \frac{Lf_{t-1} + \Delta Lf_t}{Pf_t} \tag{26}$$

$$mh^*_{i,t} = i^{e,h}_{i,t} \cdot \frac{Lh_{i,t-1} + \Delta Lh^*_{i,t}}{yn_{i,t}} \tag{27}$$

The evaluation of households' creditworthiness is performed by comparing "*notional*" debt-service ratio and the endogenous parameter Ψ_t, which represents commercial banks' acceptable level of borrower's debt burden. Commercial banks will extend credit to households if households' *notional* debt-service ratio falls lower than banks' "acceptability" threshold. Rationing takes place in the opposite case. This condition is formally stated in equation (28) below. Whenever granted a loan, households accept it at the conditions established by banks. However, they may revise their desired financial investment (i.e., the accumulation of IFs' shares) and, hence, their demand for loans in the next period in the event the interest rate paid on received loans is higher than the returns on IFs' shares (see Equation (18)).

$$\text{if } m^*_{i,t} < \Psi_t \text{then } \Delta Lh_{i,t} = \Delta Lh^*_{i,t} \text{and } i^h_{i,t} = i^{e,h}_{i,t}. \tag{28}$$

The interest rate on firms' loans is set in Equation (26) in a similar fashion as the one charged on credit to households. The interest rate non-financial firms will have to pay increases with the rise in their "updated" debt-service ratio (i.e., the accumulated stock of loans plus the new demand for credit), now computed with respect to firms net profits (Pf_t). Credit constraints do not apply to non-financial firms. This choice is motivated by the consideration that non-financial firms constitute an aggregate sector. As such, an *on-off* constraint on external financing applied to an entire economic sector may prove to be brutal at the macro level. However, an increase in the cost of credit may induce NFFs to downscale their investment plans (by reducing their profitability, for instance) and lower their demand for loans in the following periods.

Commercial banks define the value of Ψ_t by setting it endogenously within a corridor, whose floor and ceiling are parameters Ψ_{min} and Ψ_{max}, respectively—see Equation (29). Increasing (decreasing) values of (Ψ_t) stand for more relaxed (tighter) lending standards. Within such corridor, Ψ_t decreases with the ratio of non-performing loans (NPL) over due installments (see Equation (30)). This element of Equation (30) captures the idea that, witnessing higher default rates, banks become more prudent and make lending standards more stringent. On top of this, Ψ_t increases with the degree of commercial banks' compliance with regulatory capital adequacy requirements. This is modeled as the distance between commercial banks' *actual* own capital-asset ratio $(k_{B,t})$—see Equation (31) below, i.e., a measure of commercial banks' leverage, and a Basel-type exogenous regulatory capital adequacy ratio $(\bar{k})$.[14] This element suggests that the more leveraged the banking sector is, the more likely it will avoid risky loans. Other way around, when commercial banks are well within regulatory limits (i.e. $k_{B,t} > \bar{k}$), they are more prone to exploit the space of maneuver in their balance sheet to expand their business.

Equation (31) defines commercial banks' actual capital-asset ratio. It is given by the ratio between *observed* commercial banks' own funds $(\widetilde{\Omega_t^B})$ over their total *on-balance sheet* assets. Commercial banks' *observed* own funds are given by the stock of commercial banks' own funds from the previous period (Ω_{t-1}^B) once adjusted for the amount of (NPLs) suffered by banks on non-securitized loans (see Equation 32). Commercial banks' assets, instead, are constituted by the sum between banks' stock of public bonds $(B_{B,t})$ and the amount of outstanding loans net of the portion (z) moved to SPVs' balance sheet in the securitization process. Two things are worth stressing here. First, ($NPLs$) affect banks' credit policy twice. As said, they *directly* influence the determination of commercial banks' acceptable risk threshold via parameter ψ_1 and banks' perception of credit riskiness. On top of this, they may also *indirectly* induce more prudent credit policies by impinging upon banks' own capital-to-asset ratio. Indeed, rising (NPLs) erode banks' own funds $(\widetilde{\Omega_{t-1}^B})$ and cause $k_{B,t}$ to decline. Whilst this may force commercial banks to distribute less dividends and retain more profits in order to make up for capital losses (see more on this below), it will also make credit eligibility criteria more stringent. Second, it is worth noting the role played by the amount of loans generated and then securitized (z) in defining banks' actual capital-asset ratio. Indeed, the higher the amount of securitized loans, the better is commercial banks' capital-asset ratio. Consistent with this, Ψ_t increases (see Equations (29) and (30)), and banks become *less* risk adverse. In the end, commercial banks can use securitization to actively manage their balance sheet and open more space for extending more loans to the economy.

$$\Psi_t = max\left[\Psi_{min}, min(\Psi_{max}, \Psi^*)\right] \tag{29}$$

$$\Psi^* = \bar{\Psi}_{min} - \psi_1 \cdot \frac{NPL}{\epsilon \cdot Lh_{t-1}} + \psi_2 \cdot (k_{B,t} - \bar{k}) \tag{30}$$

$$k_{B,t} = \frac{\widetilde{\Omega}_{t-1}^B}{[(1 - z_t)L_t + B_{B,t}]} \tag{31}$$

$$\widetilde{\Omega}_t^B = \Omega_{t-1}^B - (1 - z_{t-1}) \cdot NPL_t \tag{32}$$

In the present model, following Botta et al. (2021); Botta et al. (2022), and consistent with Lysandrou (2011) and Goda and Lysandrou (2014), commercial banks securitize loans in the

[14] Basel-type exogenous regulatory capital adequacy ratio $(\bar{k})$ is set equal to 8 percent.

amount needed to satisfy the demand of ABSs (see more on this below) by IFs via SPV. For this reason, (z) is an endogenous variable that adjusts "on demand". It is equal to the fraction between demanded ABS and outstanding households' and non-financial firms' loans (see Equation 33). The demand for ABSs will be satisfied up to the point no more loans are available for securitization.

$$z_t = \min(1, \frac{ABS^D_{IF}}{L_t}). \tag{33}$$

At the end of each period, banks decide the share of net profit P^B_t (see Equation (34)) to distribute and temporarily shelved as dividend payable (*i.e.,* dividends determined at time t are paid in the following period $t+1$). This choice is ultimately based on banks' financial conditions and on Basel-type regulation. First, banks compute the level of own capital that, given their stock of assets, would meet the required capital adequacy ratio ($\bar{k}$)—see Equation (35). Second, they set the desired level of capital injection ($\Delta\Omega^*$) and, hence, retained profits. This is either a fixed share (ζ_B) of the distance between required and observed own capital, whenever needed (*i.e.* $k_{B,t} < \bar{k}$), or zero otherwise. This implies that banks attempt to adjust their balance sheet to comply with regulation takes place in a progressive manner.

Finally, Equation (37) tells us that whenever net profits are higher than required capital injections, dividends payable result as residual after retained profits are detracted from banks' net profits (P^B_t)—see Equation (37). Otherwise net profits are fully retained as banks' *actual* capital injection is lower than the required desired one (see Equation (38)).

$$P^B_t = \Pi^B_t(1 - \tau_\pi) \tag{34}$$

$$\bar{\Omega}^B_t = \left[(1 - z)L_t + B_{B,t}\right] \cdot \bar{k} \tag{35}$$

$$\Delta\Omega^*_t = \begin{cases} \text{if } k_{B,t} & < \bar{k} \Longrightarrow \Delta\Omega^*_t = \zeta_B \cdot (\bar{\Omega}^B_t - \Omega^B_{t-1}) \\ \text{if } k_{B,t} & \geq \bar{k} \Longrightarrow \Delta\Omega^*_t = 0 \end{cases} \tag{36}$$

$$\text{if } \Delta\Omega^*_t \leq P^B_t \Longrightarrow \begin{cases} \Omega_t = \Omega_{t-1} + \Delta\Omega^*_t \\ Div_B = P^B_t - \Delta\Omega^*_t \end{cases} \tag{37}$$

$$\text{if } \Delta\Omega^*_t > P^B_t \Longrightarrow \begin{cases} \Omega t = \Omega_{t-1} + P^B_t \\ Div_B = 0 \end{cases} \tag{38}$$

3.2.5 Investment Funds

IFs represent financial markets' operators that collect funds, i.e., IFs shares (Sh_t), that households want to invest in financial markets. Somehow, they are households' access gate to financial markets and, possibly, financial speculation, i.e., the allocation of funds between different financial assets characterized by different returns.

At the beginning of each period, IFs first update their assets and liabilities based on the amount of securitized loans incorporated in ABSs that are repaid or not. As indicated in section 3.1, successful repayments of principals of securitized loans are "converted" into IFs' deposits. The portion of *NPL*s that come from securitized loans give rise to capital losses in the form of matching reductions in the value of outstanding ABSs. Such losses on the asset side of IFs are then passed onto corresponding reductions in their liabilities, i.e., IFs' shares held by households.

After the “update” of invested funds is completed, IFs plan next round of financial investment and portfolio allocation. IFs keep a portion (η_{IF}) of collected funds in the form of deposits (Equation (39)) for precautionary reasons. This is done to meet possible demands for shares’ redemption by households. This is particularly true during periods of financial turmoil, when capital losses on ABS and, hence, IFs’ shares could induce households to increasingly redeem invested funds, i.e., divest away from IFs shares. Once defined deposits, IFs allocate the remaining between ABSs and public bonds according to changes in their relative returns. Equation (40) formalizes this allocation choice. The quota ($q^b_{if,t}$) assigned to the purchasing of public bonds is set through an adaptive rule, and decreases when the spread between the return on ABSs, (r^{abs}), and the interest rate on public bonds (i^B) observed in the current period is higher than in the previous one. In other words, the higher the return on ABSs with respect to public bonds, the lower will be the demand for the latter. The positive parameter (β) modules the strength of the impact of the variation in the spread over this choice. Demand for public bonds (see Equation (41)) is obtained multiplying ($q^b_{if,t}$) for the amount of funds collected by IFs and not held in the form of deposits ($Sh_t(1 - \eta_{IF})$). Demand for ABSs results as a residual (see Equation (42)). Finally, Equation (43) shows that in case of excess demand for ABSs, ABSs held by IFs at the end of the period will adapt to supply. As said, this is given, by construction, by securitized loans. Other way around, IFs purchase ABSs as far as there are loans available for securitization.

$$D_{IF,t} = \eta_{IF} \cdot Sh_t \tag{39}$$

$$q^b_{if,t} = q^b_{if,t-1} \cdot \{1 - \beta[(r^{abs}_t - i^B_t) - (r^{abs}_{t-1} - i^B_{t-1})]\} \tag{40}$$

$$B^D_{IF,t} = q^b_{if,t} \cdot SH_t \cdot (1 - \eta_{IF}) \tag{41}$$

$$ABS^{*D}_{IF,t} = Sh_t \cdot (1 - \eta_{IF}) - B_{IF,t} \tag{42}$$

$$ABS_{IF,t} = min(z_t L_t, ABS^{D*}_{IF,t}) \tag{43}$$

4. Simulations

In this section of the paper, we present the results of our simulation analysis. As said, the economy is populated by one thousand heterogeneous households ($\bar{N} = 1000$). All stocks are initially set equal to zero but a few ones, productive capital for instance, that need to take positive values to activate the economy. In what follows, we illustrate the last 150 periods of simulations only in order to get rid of the initial transient dynamics. The first 10 periods portrayed in the plots show the evolution of the economy in the *Baseline* (BL) scenario (see more on this below) before the introduction of any fiscal policy action aimed at reducing public debt. The following 140 periods, instead, show how the economy responds to the two alternative fiscal policy measures taken into account in our study. We perform 100 Monte Carlo (MC) simulations per scenario and show the evolution of the median value of the macro-financial/distributive variables of interest, together with the 5th–95th percentiles interval.

Our study aims at contributing to the ongoing debate about the return to fiscal rules and fiscal consolidation. It does not aim at replicating (or forecasting) the evolution of any specific economy. It rather looks at the *qualitative* interaction between fiscal and monetary policy, and the complex co-evolution of a variety of macro-financial-distributive variables under different fiscal policy “regimes”. In this sense, our goal is somehow different from that pursued by Dosi et al. (2015) and, above all, Teglio et al. (2019). We do not look at, say, the “optimal policy response” to (financial-Minskyan) crises that may endogenously emerge in the economy, but rather at cycles that originate (or not) by the way alternative fiscal consolidation strategies interact with monetary policy across “normal” business cycles. Given our goal, we design our model keeping stochastic factors at a minimum and all sectors macro-aggregated but households. Such modeling choice obviously impedes us to generate the more pronounced volatility and rich micro stylized facts that usually emerge in fully-fledged AB models, like K+S models (Dosi et al., 2010; Dosi et al., 2013; Dosi et al., 2015), for instance. However, it somehow better spotlights policy-induced instability, in particular when it comes to spending-based fiscal rules.

In our hybrid SFC model with heterogenous households, the *Baseline*, blue lines in Figures 2–16 below, describes the evolution of the economy under the behavioral rules presented in the previous sections of the paper when no fiscal policy is implemented to control public deficit and diminish public debt. After the initial transient dynamics, the economy reaches a quasi-steady state featuring what may be commonly perceived as a high (equilibrium) value of the public debt in the order of about 140 percent of GDP.[15] In this context, the central bank defines its monetary policy stance according to an inflation target or, better to say, inflation “threshold” equal to 4 percent. Following Rudd (2022), Korenok et al. (2023) and Pfauti (2024), this is the value of inflation above which “accelerationist” patterns may settle in the US economy (among others) due to rising economic agents’ attention to the dynamics of aggregate prices. Monetary institutions tend to avoid spiraling inflation pressures to build up as they may then require much tougher restrictive measures to bring inflation back under control. In line with this evidence, we model monetary policy so that it remains exclusively committed to keeping inflation at low one-digit values *below*, perhaps close to, 4 percent. This “parametrization” of central bank’s behavior (at least in relation to its inflation goals) in turn helps us to avoid fiscal instability that, at quite high public debt levels, can possibly be caused by more stringent inflation targets inducing excessively harsh monetary policy stances and too high policy rates.

Despite the in-built reduced volatility that characterizes our model, it is equally able to generate endogenous demand-driven growth and business cycles across the various 100 MC simulations we run in the Baseline (see Figure 1), with investment as the most volatile component of growth. Moreover, distributive records in our artificial economy mimic quite well the ordering and the magnitudes of income and wealth inequality (with the latter higher than the former) that characterize most western countries in the last decades (see Figures 15 and 16). Last but not least, when volatility gets more pronounced after the implementation of the spending-based fiscal rule, consistent with Botta et al. (2021), credit follows the well-known pro-cyclical pattern across cycles (see Figure 12). Moreover, when financial stress escalates and the relative spread of ABSs gets negative with respect to public bonds, IFs reshuffle the composition of their portfolio according to the “flight to quality” we have very clearly observed in the case of the 2007-2008 financial shock (see Figures 13 and 14).

4.1 Spending-based fiscal rule vs. wealth tax

In Figures 2–16 below, we compare the Baseline scenario described above with the *Spending-Based Fiscal Rule* (SBFR) scenario—black lines in the following figures—in which the government aims at putting public debt under control by following fiscal rules that see cuts in *primary non-cyclical* public spending as the primary tool to achieve fiscal consolidation. The *Wealth-tax* (WT) scenario (red lines), instead, shows the effects of the government’s decision to pursue fiscal consolidation via the introduction of a wealth tax raising fiscal revenues.

In line with above-mentioned literature on “optimal” designing of fiscal rules and differently from previous AB models on this topic, in the SBFR scenario, we assume that the government takes *primary non-cyclical* public spending as reference policy variable to control public deficit

[15] At the end of 2021, with economies recovering out of Covid-19 pandemic, the (unweighted) average of the debt-to-GDP ratio in G7 economies was actually quite close to this value and equal to 132.4 percent. All countries but Germany recorded public debt stocks substantially higher than 100 percent of GDP. The decline in such ratios in the following years has been primarily due to well-known spike in inflation rates.

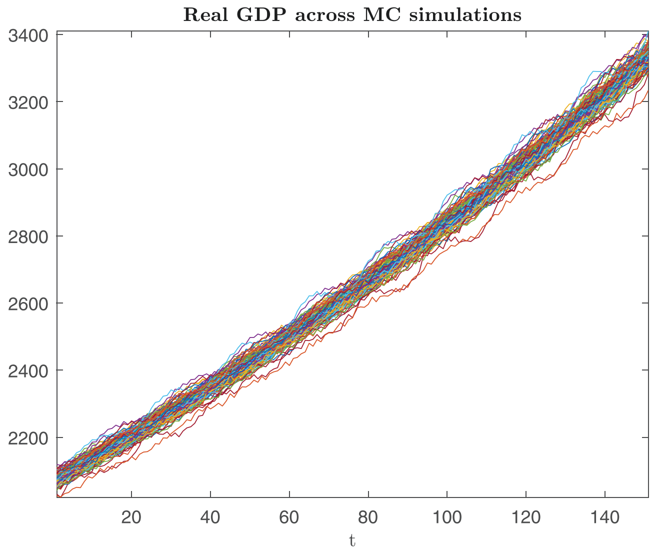

Figure 1. Endogenous growth and cycles across MC simulations in the baseline.

and possibly reduce public debt. We operationalize the spending-based fiscal rule by modifying equation (20) that defines public purchases. In its revised version (see Equation (45) below), we in fact endogenize the parameter linking public purchases to private consumption as signaled by the tilde over (ξ_2). More specifically, we assume the domestic government revises (ξ_2) downward whenever, in the previous period, the public deficit-to-GDP ratio (def_{t-1}) has turned higher than a public deficit "*anchor*" (def^T) equal to 3 percent. This is the reference value that the government uses to control and manage actual public deficit.[16] In the event of an observed public deficit-to-GDP ratio greater than (def^T), the government diminishes ($\tilde{\xi_2}$), hence primary non-cyclical public purchases, proportionally to the distance between (def_{t-1}) and (def^T). In other words, the reduction of (ξ_2) stands for policy-makers' decision to reduce the size of public purchases (read the public sector) with respect to private consumption and the private sector of the economy. And the greater the "excessive" public deficit with respect to the anchor, the harsher the spending cut and the squeeze of public purchases. Conversely, if the observed public deficit is below or equal (def^T), ξ_2 remains at its original value.

$$\begin{aligned} G_t &= \xi_1 \cdot G_{t-1} + (1-\xi_1)\cdot \tilde{\xi_2} \cdot C_t \\ &\text{if } def_{t-1} > def^T \Longrightarrow \tilde{\xi_2} = \xi_2 \cdot [1-(def_{t-1} - def^T)] \\ &\text{if } def_{t-1} \le def^T \Longrightarrow \tilde{\xi_2} = \xi_2 \end{aligned} \tag{45}$$

In the WT scenario, we simulate the effects of the alternative fiscal policy strategy based on the introduction of a tax on wealth. The purpose of the wealth tax is certainly to collect fiscal revenues tackling increasingly high income inequality and wealth concentration featured by most developed countries (the US in particular) in the last four decades. Accordingly the money collected is entirely used to improve fiscal balance. Here, however, we are also interested in studying its wider macro-financial consequences. For this reason, for the sake of comparability with the SBFR scenario, we design the wealth tax in such a way that, in the long term, it leads to a similar reduction in the public debt-to-GDP ratio to that one achieved via the spending-based fiscal rule.

[16] For the sake of clarity, given the qualitative nature of our study, it is important to emphasize that such public deficit "*anchor*" (def^T) does not aim at mimicking public deficit "targets" or "ceilings" that characterize EU-type fiscal rules—see Kamps and Leiner-Killinger (2019) for a detailed analysis and comparison of these terms. It simply represents a sort of "term of comparison" that the domestic government may use to control and govern public deficit consistently with a certain reduction path in the public debt stock.

More specifically, we assume the government to apply a fixed permanent 0.35 percent tax rate over total wealth held by the top 10 percent richest households in the economy.

4.1.1 Debt Sustainability

Figures 2 and 3 show the evolution of the public debt-to-GDP and deficit-to-GDP ratios in the last 150 periods of simulation. Before the introduction of fiscal adjustments, the three scenarios all display the same dynamics and the economy exhibits a stable cyclical pattern. In the baseline, the public debt-to-GDP ratio stabilizes around 140 percent, whilst the public deficit is in the order of 5.5 percent of GDP[17].

The government may take the baseline values of the above fiscal variables as too high and decides for the implementation of fiscal consolidation programs. As it emerges from Figure 2, both the spending-based fiscal rule and the wealth tax succeed in reducing the debt-to-GDP. In the SBFC scenario, the debt-to-GDP ratio declines by about 20 percentage points after 140 periods since the introduction of the spending-based fiscal rule. It gets significantly lower, from a statistical point of view, than its pre-fiscal policy shock in the baseline. We design the wealth tax to lead to a closely similar long-run outcome in the evolution of the debt-to-GDP ratio. This is statistically equivalent across the SBFR and the WT scenarios at the end of the simulation period.

Despite similar long-run results, the two scenarios differ remarkably as to the "traverse" towards the new equilibrium. First, similar to Dosi et al. (2015), the SBFR is self-defeating in the short-to-medium run. Indeed, in the aftermath of the implementation of this policy, public debt bounces from about 140 percent of GDP to around 150 percent. It then gradually diminishes. The debt-to-GDP ratio actually falls below its initial level only after about 25 periods since the implementation of the spending-based fiscal austerity. The introduction of the wealth tax is able to immediately reduce the debt-to-GDP ratio instead. Second, whilst the wealth tax produces a monotonic reduction of the debt-to-GDP ratio, such variable presents a quite marked and statistically significant cyclical pattern in the SBFC scenario.

These different traverses are due to the different effects that the spending-based fiscal rule and the wealth tax induce over the real sector of the economy, and the way they interact with monetary policy (see more on this below). The initial self-defeating outcome of spending cuts with respect to the wealth tax comes from the much harsher effects that the former bear on aggregate demand, hence real GDP and economic growth, than the latter. The substantial fall in aggregate demand and real GDP, together with higher unemployment-related burden on fiscal balance, that takes place in the SBFR scenario frustrates the initial attempts of reducing the public debt-to-GDP ratio via cuts in public purchases. Such initial unstable dynamics is reverted only when monetary policy gets sufficiently more expansionary in response to the decline in inflation (see more on this below). On the one hand, this will reduce the interest "bill" over the accumulated stock of public debt with obvious benefits in terms of lower public deficits. On the other hand, it will contribute to feed economic recovery, thus raising real GDP and possibly reducing the public debt-to-GDP ratio.

Figure 3 also shows that similar long-term reductions in the public debt-to-GDP ratio are achieved via different dynamics of the public deficit. In the WT scenario, fiscal deficit declines immediately and stabilizes at a statistically lower value than in the Baseline around 4.5 percent of GDP. In the SBFC scenario, it initially declines less quickly than in the WT case, but it eventually reaches substantially lower levels. It oscillates around 3.5 percent of GDP, and sometimes reaches values lower than 3 percent in order to make up for the much more pronounced slowdown in the economic activity that occurs in this scenario. Once again, the interaction between the SBFR and monetary policy lies behind the cyclical pattern followed by the deficit-to-GDP ratio in this scenario.

[17] As a term of comparison, according to the IMF's World Economics Outlook Dataset, USA's average public deficit-to-GDP ratio between 2001 and 2023 is equal to 6.2 percent. After the large deficits due to responses to the 2007-2008 financial shock and the Covid-19 crisis, US public deficit still remains as high as 4.8 of GDP.

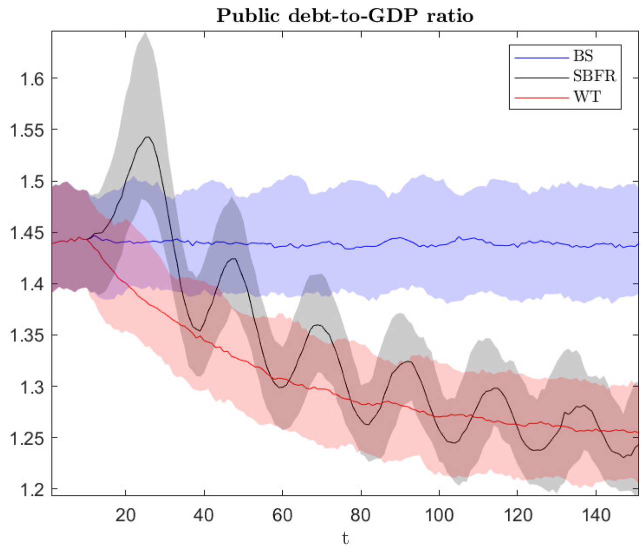

Figure 2. Public debt-to-GDP ratio.

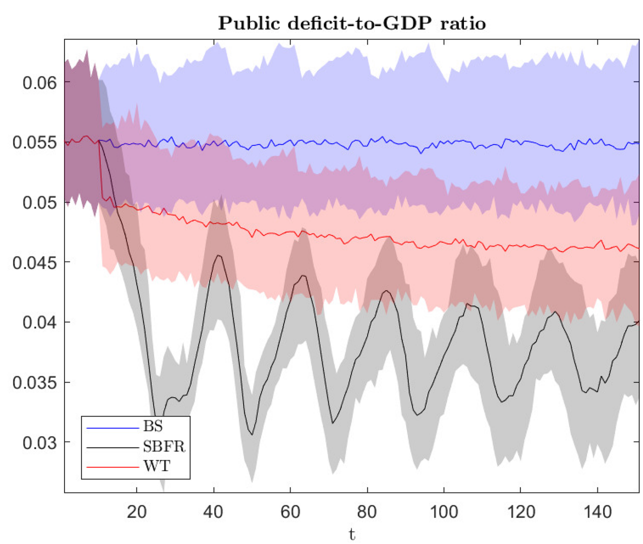

Figure 3. Public deficit-to-GDP ratio.

4.1.2 The real economy

Figure 4 portrays the evolution of real GDP (in log terms) across the three different scenarios. In the WT scenario, the introduction of the wealth tax bears negligible negative effects in terms of the dynamics of the real GDP and of unemployment. The evolution of real GDP tracks closely that one observed in the baseline, so much so they are not statistically different each other. The small reduction in real GDP taking place in the WT scenario comes from the contractionary effect that the wealth tax may induce over private consumption. Indeed, in Equation (16), private consumption depends on wealth via two channels: a direct one linked to the propensity to consume out of wealth; an indirect one related to the propensity to consume out of financial incomes, namely dividends and return on shares, both of which stem from households' accumulated wealth stock. The implicit tax-led reduction in the wealth stock held by top 10 percent richest households eventually lowers private consumption, diminishes production and reduces real GDP. Such negative effect is very mild, though, given the low propensity to consume out of wealth and financial incomes (see Caceres (2019); De Bondt et al. (2019); Onaran et al. (2011)) characterizing wealthy households at the top of income and wealth distribution.

The introduction of the SBFR does cause a statistically significant drop in the real GDP instead. More than this, consistent with Dosi et al. (2013); Dosi et al. (2015), it substantially increases the volatility of productive investment (see Figure 6) and the one of the whole economy (see Figure 4). Also note that the SBFR-led contraction in economic activity will bear economy-wide consequences that go well beyond the short run. In fact, the initial loss in real GDP will never be fully recovered, so that the SBFR will have a permanent negative "*level effect*" over real GDP. In the SBFR scenario, the level of real GDP will remain permanently below those recorded in the Baseline and in the WT scenarios[18].

The deeper negative impact the SBFR carries over real GDP than the wealth tax does is a consequence of the far tougher contractionary effect of the former on aggregate demand. In fact, cuts to primary non-cyclical public purchases directly depresses an important component of aggregate demand. Depressed aggregate demand in turn translates into excess supply. When firms face unsatisfactory low levels of capacity utilization (see Figure 5), as well as reduced profitability, they downscale production plans and curtail investment (see Figure 6). All these forces ignite a self-reinforcing downward spiral between aggregate demand and production that inevitably leads unemployment to rise (see Figure 7). The ensuing contraction of private consumption exacerbates the recession dragging down even further the real GDP. Automatic stabilizers in the form of public dole to unemployed people may tame the fall of the economy. However, they cannot fully compensate for the SBFR-induced drop in aggregate demand, despite the disbursed amount of the public dole rising from well below 1 percent of GDP to almost 3 percent.

As sketched above, the negative effects of public spending cuts over real GDP explain a good deal of the initial self-defeating outcomes of the SBFR. On the onset of such policy measure, the public debt-to-GDP ratio rises because the denominator drops. On top of this, the implementation of the SBFR also bears major impacts over the composition of public spending. In our model, total public outlays are made up by three components: (i) primary non-cyclical public purchases, i.e., the target variable of the SBFR; (ii) the public dole to unemployed people; (iii) interest payments on the accumulated stock of public debt. Whilst the SBFR searches for reductions in public deficit and debt via cuts in the first item, economic recession and higher unemployment lead to a rise in the second. With the rates of unemployment peaking at 15 percent and then stabilizing at about 12-13 percent (see Figure 7), the public dole becomes a significant burden on public finances that partially offsets public savings obtained via lower public purchases. By the same token, the fact that the wealth tax procures very little harm, if any, to the real economy explains why this fiscal policy recipe performs better than the SBFR in its attempt to stabilize public finances.

4.1.3 Inflation, monetary and interaction with fiscal policy

Figure 7 reports the significantly different dynamics of the unemployment rate in the SBFR case on the one side with respect to the Baseline and WT ones on the other. Albeit unemployment slightly increases after the introduction of the wealth tax, it remains statistically equal to the one observed in the Baseline. This is not the case in the SBFR scenario, where it clearly reaches significantly higher values. These facts are in turn reflected in the evolution of inflation. Figure 8 shows the substantial gaps that divides the baseline and WT scenarios with respect to the SBFC one. Inflation can be considered statistically equal in the first two scenarios. Consistent with central bank's goal, it remains constantly below 4 percent "threshold" with an average value around about 3.5 percent. In the SBFC scenario, instead, inflation follows wider cycles and drops, on average,

[18] In the SBFR scenario, the adoption of a more expansionary monetary policy stance by the central bank (see more on this below) certainly helps to feed economic recovery. In the long run, once the economy achieves a higher (lower) average equilibrium value of unemployment (inflation), the dynamics of labor productivity and economic growth will return to be similar to that observed in the Baseline and in the WT scenarios. However, the SBFR might also give rise to negative "*growth effects*" in a more complex economy where firms carry out innovation processes that are vitally stimulated by high levels of aggregate demand (see Dosi et al. (2015)), cuts to public spending also hit growth-enhancing public activities (see Deleidi and Mazzuccato (2019)) or, more simply, heightened volatility negatively feeds back into economic dynamics itself (see Cerra and Saxena (2008) and Cerra et al. (2023)).

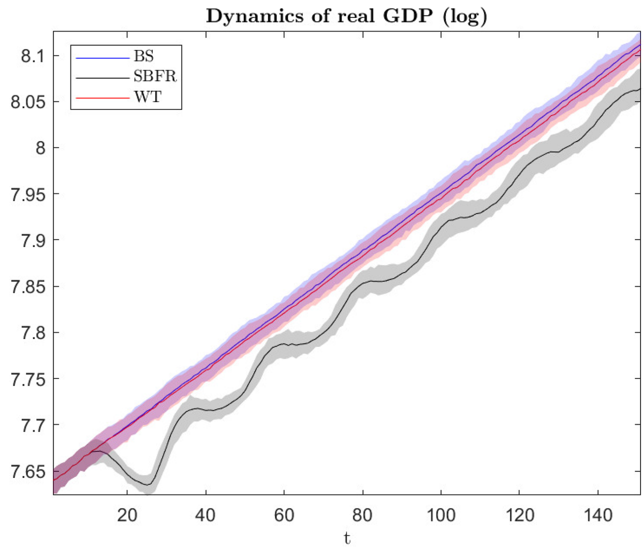

Figure 4. Dynamics of real GDP (log value).

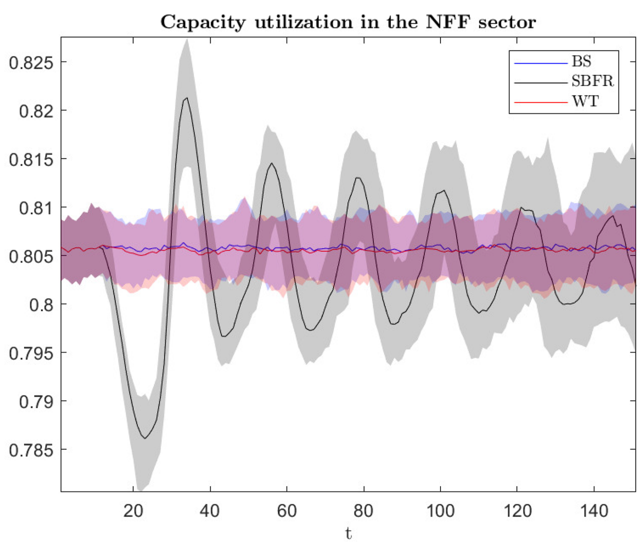

Figure 5. Capacity utilization in the NF firm sector.

to significantly lower values around 2.5 percent. The more significant although more volatile slowdown in price dynamics observed in the case of a spending-based fiscal rule is the result of the harsher economic contraction such fiscal policy triggers. Higher unemployment weakens the bargaining power of trade unions and thus reduces wage inflation according to a standard Phillips-type curve mechanism. Moreover, larger excess capacity induces non-financial firms to reduce the mark-up and cut prices. Both forces ultimately contribute to lower inflation down.

From a policy perspective, the evolution of inflation must be analyzed in conjunction with the policy rate set by the central bank. In Equation (24), we assume the central bank follows an *inertial* Taylor rule through which it responds to changes in price dynamics and, at the same time, it tries to keep inflation below the 4 percent "threshold" level. Inflation and the central bank policy rate thus co-evolve endogenously. In this context, fiscal consolidation, with its possibly negative effect over aggregate demand, production, employment, and ultimately inflation, may

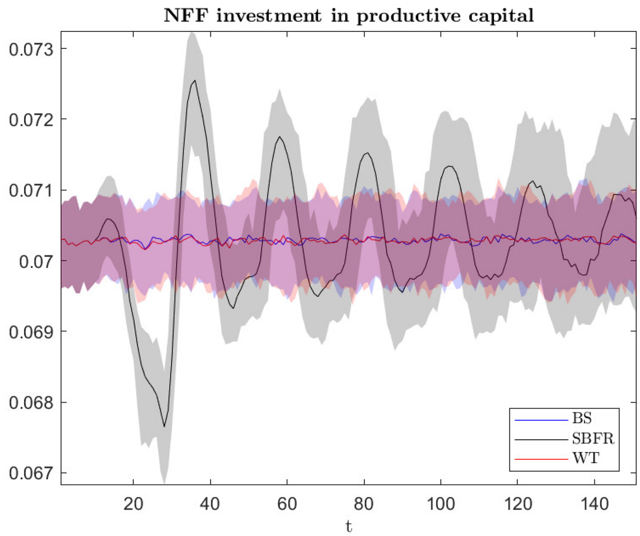

Figure 6. NF firms' investment in productive capital.

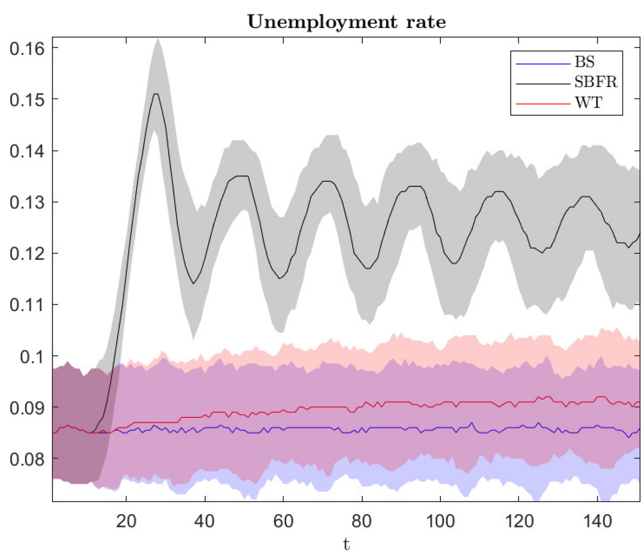

Figure 7. Rate of unemployment.

also *indirectly* induces a reduction in the policy rate. In the WT scenario, the reduction in the policy rate and the difference with respect to the baseline are very mild and non statistically different with respect to the Baseline. They are much more substantial and statistically relevant in the SBFR instead (see Figure 9).

The *average* lower policy rate recorded in the SBFR scenario, as well as its more pronounced cyclical pattern are integral elements of the above-mentioned interaction between fiscal and monetary policy, and to the chain of events triggered off by spending-based austerity itself. Due to its initial self-defeating outcome, the SBFR does not succeed in bringing public deficit within the target. Fiscal consolidation is prolonged, stifling economic growth and generating a *self-imposed* recession. Unemployment augments to double-digit levels and inflation plummets. The very substantial slowdown in price dynamics reverberates into the behavior of central bank, which cuts

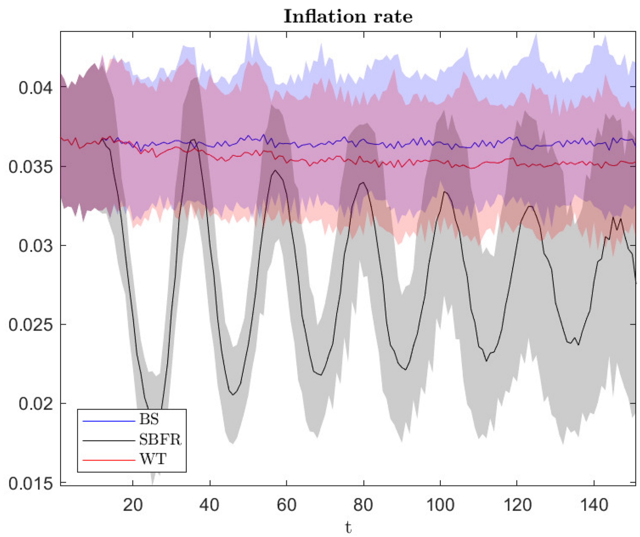

Figure 8. Inflation rate.

the policy rate accordingly. Policy rate's cuts can be as large as 250 *bps* from about 3.5 percent down to 1 percent. The permanent negative *level* effect that SBFR carries out over real GDP, unemployment, and inflation ultimately "forces" the central bank to maintain a low interest rate. A more expansionary, on average, monetary policy stance somehow becomes the *new normal* when SBFR is implemented with respect to the baseline and WT scenarios.

The reduction in the policy rate, and the ensuing lower cost of credit, have a twofold positive effect on the economy. On the one hand, it reduces the burden of public debt service, improves fiscal balance, and makes the government's compliance with the SBFR easier. When this happens, the government gains wider margins of maneuver. Spending cuts are removed or at least softened. Such a more expansionary fiscal policy stance in turn spurs economic recovery. On the other hand, the introduction of the SBFR also caused creditworthy borrowers to initially decrease alongside with the number of employed households. With rising NPLs, a higher portion of households got credit rationed and a credit crunch took place (see more on this below). Since credit is also used to realize consumption plans, lower credit supply hit aggregate demand further and exacerbated the initial economic downfall. The central banks helps to interrupt the credit crunch and to revert the cycle by pursuing a more expansionary monetary policy stance. Indeed, more households obtain loans and are able to fulfill their consumption plans when the policy rate and, hence, interest rates on banks' credit reach sufficiently low values. Thus, the economy rebounds also thank to a new wave of monetary policy-led credit expansion broadening the number of creditworthy borrowers. Economic recovery and expansion continue insofar as they create pressures on inflation and induce monetary authorities to tighten monetary policy. When the monetary authorities progressively "normalizes" the policy rate by raising it (albeit at values still below what observed in the baseline) in response to rising inflation, the above sequence of events happens again and the upward phase of the cycle eventually wipes out. In the end, the interplay between spending-based fiscal policy and inflation-focus monetary policy lies behind the relatively more acute cyclicality of the economy in the SBFR scenario.

4.1.4 Credit market and the financial sector

Figures 10 and 14 provide more details about the effects of austerity measures, of spending cuts first and foremost, over the financial side of the economy.

Figures 10 and 11 document the evolution of NPLs. Fiscal austerity leads to a rise in households' NPLs due to its detrimental effects over economic activity, employment in particular, by making a wider range of unemployed households unable to honor they payment commitments.

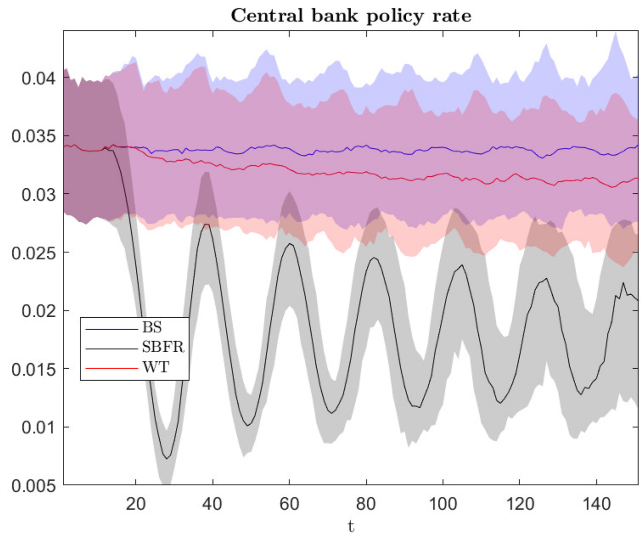

Figure 9. Central Bank's policy rate.

The rise in NPLs is particularly evident in the SBFR scenario than in the Baseline and in the WT ones. Spending cuts cause the median value of households' NPLs to increase by about 25 percent with respect to the Baseline in most periods of simulation. It fluctuates between 4.5 and 6 percent of outstanding households' debt. From a strictly statistical point of view, the intrinsic high volatility characterizing NPLs, as well as CBs' credit policy towards defaulting households,[19] tend to make such difference not significant. However, the SBFR is the only form of austerity that, throughout 100 MC simulations, can generate peaks in NLPs that reach double-digit values at about 14 percent, and that are persistently higher than what observed in the other scenarios (see Figure 11). Such intra-period differences between the SBFR scenario and the Baseline will actually accumulate through time and will help to explain different evolutions of wealth inequality in the former with respect to the latter (see more on this below).

The interaction between fiscal and monetary policy is, once again, the driving force behind the more pronounced cyclical pattern followed by NPLs in the SBFR scenario. At the bottom of the recession, expansionary monetary policy and the ensuing lower interest rates will make it easier for households to get access to bank credit. Credit expansion feeds the recovery and, at the same time, gets facilitated by improving economic conditions also prompted by the softening of austerity and (at least partial) removal of spending cuts that expansionary monetary policy opens space for. Those households who get access to credit may eventually find themselves unable to meet their debt obligations in the future with the new progressive tightening of monetary and, hence, fiscal policy along the upward phase of the cycle.

Figure 12 portrays the evolution of households' debt-to-disposable income ratio instead. The substantially more acute cyclical pattern characterizing the SBFC scenario must be interpreted in light of the credit cycle just described. In fact, the reduction in household debt (to-income ratio) that is observed at the macro level when recession unfolds is the result of "*forced*" deleveraging households have to go through when they default on accumulated debt (which thus "disappears" from their balance sheets) and/or when they become credit-rationed. The other way around, this is an emerging macro property of the economy that hinges upon a micro-level phenomenon.

It is interesting to note that households' debt to disposable income ratio gets slightly lower also in the WT scenario than in the baseline (albeit in a non-statistically significant way). This

[19] In this model, whenever a household defaults on its debt, it gets excluded from bank's credit in the following four periods of simulation. This assumption captures the credit crunch that frequently occurs in the aftermath of widespread defaults. However, it also tends to lower NPLs themselves in periods of "financial deleveraging" following those characterized by heightened financial instability.

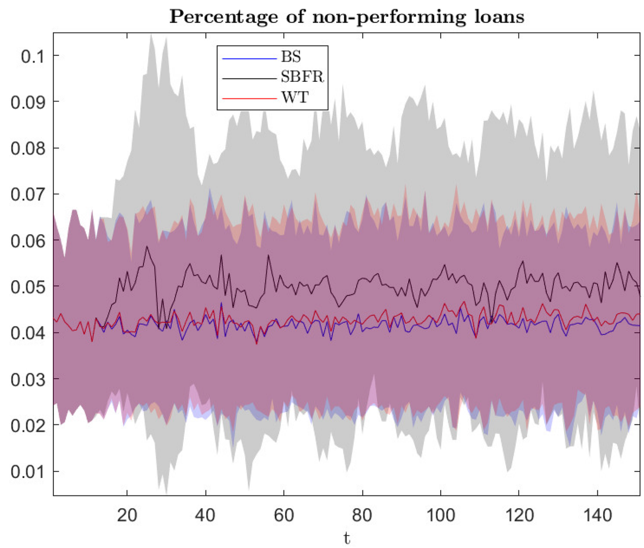

Figure 10. Percentage of non-performing loans.

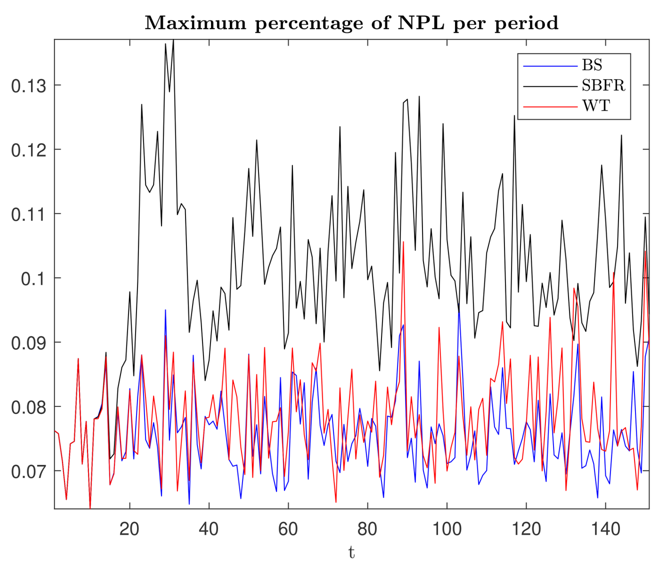

Figure 11. Peaks in households' NLPs.

may appear surprising at first, considering the quite different economic mechanisms activated by the imposition of a wealth tax with respect to spending cuts. This result finds an explanation in the functioning of the financial market, the market for ABSs more specifically. In our financialized economy, loans are securitized "on demand" in order to provide the inputs for the production of ABSs. The demand (and, hence, production) of ABSs in turn depends on household (indirect) wealth allocation via IFs' portfolio choices. Households purchase shares issued by IFs, which then use collected funds to buy either public bonds or ABS according to their relative returns. In the end, the higher household wealth, and the higher the relative return from ABS, the more loans will be securitized, thus permitting commercial banks to extend more credit to the economy. In the WT scenario, two elements contribute to reducing the demand for ABS: the tax on wealth and the lower interest rate, which decrease, respectively, the stock of resources that households

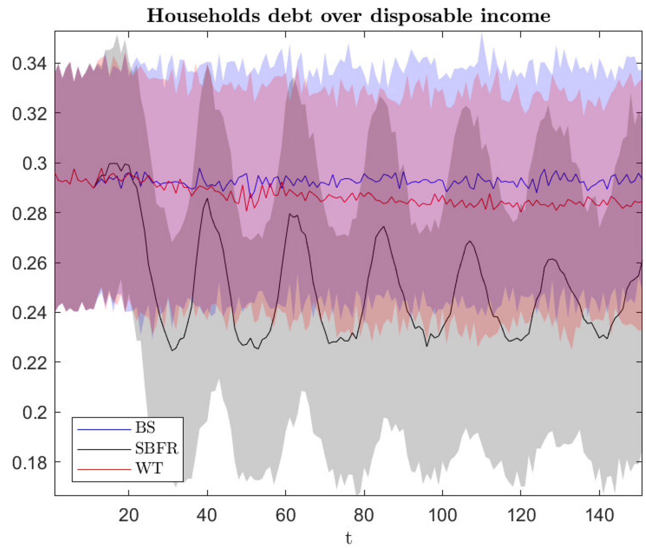

Figure 12. Households' debt over disposable income.

can invest in IFs' shares, and the returns on ABSs. The lower demand for ABSs in turn causes securitization to slow down and banks to adopt more conservative credit policies. The result of all this is lower households' debt due to more stringent access to bank's credit as well as a (moderate) deceleration of the economy with respect to the baseline (see Figure 4).

To be fair, this last mechanism is at work in the SBFR scenario as well. Also in this case the demand for ABSs and, therefore, securitization fall. However, the main driver of these outcomes is the evolution of the relative returns of ABSs versus public bonds (see Figure13). At the onset of austerity, the spread between ABSs and public bonds rises. Since the economic situation worsens due to the spending cuts, firms' revenues and wages start falling. This means that both households and firms become riskier borrowers. Commercial banks apply a higher mark-up when setting the interest rate on their loans, both for individual households and for the firm sector. The increase in the interest rate on bank loans "passes through" into higher (relative) returns on ABSs, which use securitized loans as underlying assets. When the credit crunch unfolds and NPLs start rising, things revert and ABSs' spread falls into negative territory due to mounting unpaid interests on non-performing securitized loans. Such a negative spread obviously drags the demand for ABSs down, hence the recomposition of IFs' portfolio away from ABSs reported in Figure 14. Also in the SBFR scenario, and more strongly than in the other cases, credit supply will eventually get compressed since the ABS-securitization-banks' loan "production chain" (i.e., the essence of the "originate and distribute" banking model) seizes up, at least temporarily.

4.1.5 Inequality

A core motivation behind campaigns asking for the introduction of a wealth tax is increasingly (unacceptably) high wealth concentration and the spreading perceived need to tackle it. Figures 15 and 16 describe the evolution of income and wealth inequality, respectively, in the three scenarios considered in our analysis.

Gross income inequality rises in a statistically significant way for most periods of simulations in the SBFR scenario compared to the Baseline. On the one hand, the financial components of gross income (i.e., non-financial firms' and commercial banks' dividends as well as returns on IFs' shares) tend to decrease. These types of income, which mostly accrue to wealthy households at the top of the distribution, are reduced by spending-based austerity-led recession, by rising NPLs, and by the indirect effects of spending cuts over ABSs' (and, hence, IFs' shares) returns just discussed in the previous section. On the other hand, however, spending cuts hit the real economy severely and cause a permanent increase in unemployment. The consequent fall in wage income

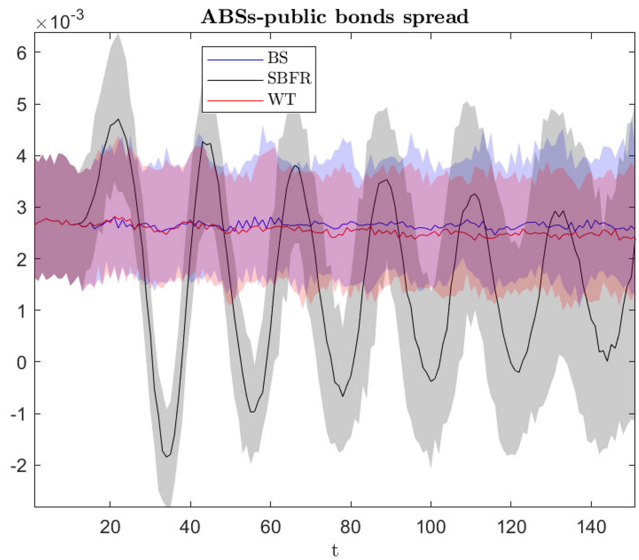

Figure 13. ABSs-public bonds spread.

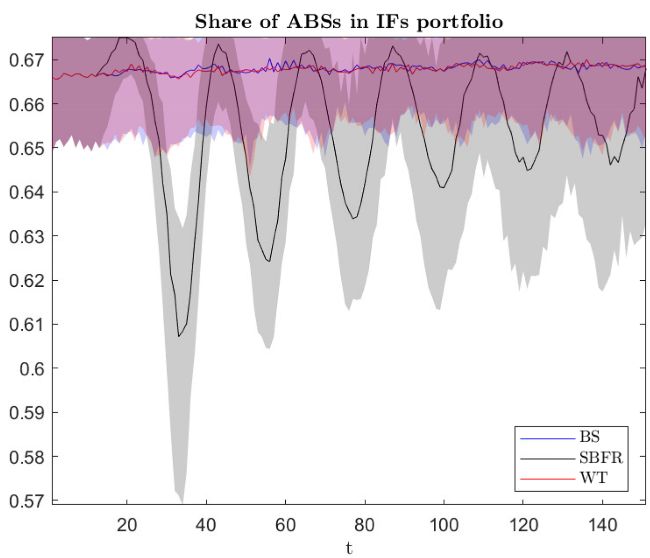

Figure 14. Share of ABSs in IFs portfolio.

makes the brunt of spending-based austerity fall on the shoulders of wage earners, so that, in the end, income inequality increases substantially when spending cuts are implemented.

Income inequality slightly decreases, even though this reduction does not appear statistically relevant, in the WT scenario with respect to the Baseline instead. In this regard, it is important to remark that, in our model, fiscal revenues from wealth tax are aimed at improving fiscal balance only. They are not meant to finance any transfer or public policy in support of low-middle income households. As such, they do not give rise to any redistribution, at least directly. The small positive effect of the wealth tax in terms of marginally lower income inequality comes from the effects such fiscal measure induces over the market for ABSs. Indeed, reduced wealth concentration lowers the demand for IFs' shares and, hence, that for ABSs. This in turn reduces the extent of the securitization process. Lower-scale securitization implies that a lower portion

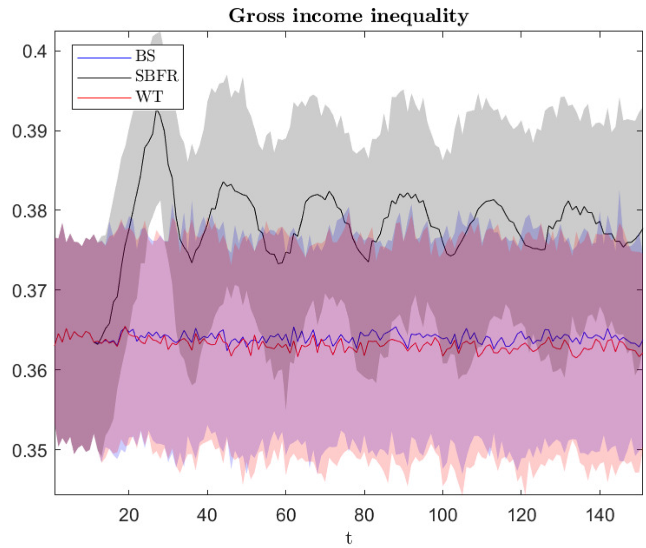

Figure 15. Gross Income Inequality (Gini Index).

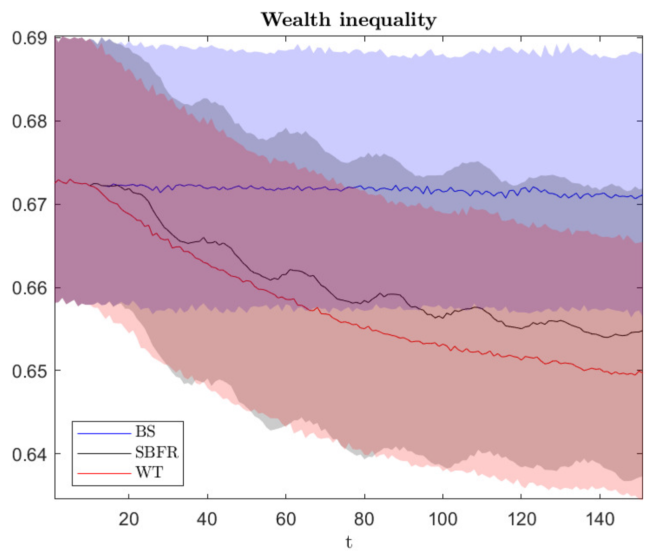

Figure 16. Wealth inequality (Gini index).

of interests paid by indebted households to service their debt eventually goes into the hands of wealthy households holding IFs' shares (Botta et al., 2021), hence the ultimate positive impact over income inequality.

Figure 16 shows what happens to the level of wealth inequality in the three scenarios. As expected, the imposition of a wealth tax over 10 percent richest households gives rise to a significant reduction in wealth concentration and lower wealth inequality. What might appear to be surprising is that also the introduction of spending cuts induce a remarkable and, over time, statistically relevant reduction in wealth inequality with respect to the Baseline. Such evolution is actually not dissimilar to what observed in the WT scenario. The economic mechanisms leading to lower wealth inequality in the SBFR scenario are fundamentally different from those at work in the WT one though. In the SBFR scenario, the main source of falling wealth inequality are

NPLs and balance sheet interconnections. Indeed, in our financialized economy, the securitization process transforms original commercial banks' assets into ABSs underlying IFs' shares held by (wealthy) households. Whenever spending cuts lead the economy to slow down and unemployment to soar, more unemployed households become unable to repay principals and default on their debt. Part of households' debt has been securitized though, so that NPLs do not only reduce commercial banks' assets and own funds, but also (pro quota) the value of IFs' shares. The default of indebted households that characterizes the financial turmoil ignited by spending cuts thus leads to capital losses and a deterioration of wealth in the upper ranks of wealth distribution. Such downward trend in the (relative) wealth of the richer is also reinforced by the fall in financial income due lower interest rates and lower financial incomes documented above. Interestingly, this result may somehow mimic the reduction in wealth inequality well documented by Piketty (2014) at the time of the 2007-2008 financial shock when ABSs and other complex financial products produced via securitized loans were at the epicenter of the financial meltdown. Whilst the 2007-2008 financial crash was the outcome of intrinsic Minskyan-type instability characterizing capitalist economies, our finding comes from (wrong) policy-induced instability.

An important result emerges from our simulations. If we look at the relative wealth position of high-income vs. low-middle income households, the usual political aversion of wealthy people against wealth taxation in comparison to spending cuts may well be misplaced. In a financialized economy where financial income accruing to and financial wealth held by rich households depend on the ability of indebted (low-middle income) households to honor their debt, spending cuts that impinge upon the financial solidity of the latter eventually cause wealth losses to the former. In a financialzied economy, fiscal consolidation based on the introduction of a wealth tax may become preferable with respect to harsh public spending cuts. We elaborate on this result more in the two next sections.

4.2 Comparing different wealth tax scenarios

Given the results of the simulations described in Section 4.1, here we conduct some additional experiments focusing on the WT scenario. We consider different wealth tax regimes in terms of coverage and tax rate. For the sake of comparability, we calibrate the different tax rates in such a way they all lead to closely similar values of the debt-to-GDP ratio in the long run. In Figures 17–20, the red line still represents the "benchmark" wealth tax regime considered in Section 4.1, with a tax rate equal to 0.35 percent applied to the top 10 percent richest households in the economy. The purple line, instead, now represents a wealth tax regime that targets the wealthiest 1 percent households only, and imposes a tax rate equal to 2.5 percent. Finally, n the wealth tax regime expressed in green color, tax rate is reduced down to 0.15 percent and it is levied on all households populating the economy.

With the public debt-to-GDP ratio that, by construction, follows very similar trajectories in the three regimes considered in this experiment (see Figures 17), Figures 18 and 19 reveal that significant differences do not emerge either in the evolution of the real GDP or income inequality. What may initially appear as a surprising result can actually be understood by recalling that wealth taxes are not meant to produce any direct redistribution from high-income households to low-middle income ones. In our model, additional fiscal revenues from the wealth tax have the exclusive purpose of improving the fiscal balance and favoring the reduction of public debt. As such, it is not surprising at all that different wealth tax regimes designed to carry out similar effects over public debt will not carry out substantially different implication for the real economy.

What is different in the three alternative wealth tax regimes is the evolution of wealth inequality though. The reduction in wealth inequality is much more sizable when the wealth tax concentrates on top 1 percent richest households only (see purple line in Figure 20). A wealth tax regime in which all households are equally subjected to such fiscal imposition (green line in Figure 20) records a way more modest reduction in wealth inequality. More than this, the mild decrease in wealth inequality observed in this last scenario is mostly due to somehow "perverse" mechanisms. Wealth tax collection imposed on low-income households may in fact imply some of them will not be able to service their accumulated debt anymore. As already described before, higher households' delinquency rates and rising NPLs will be transformed into capital losses for

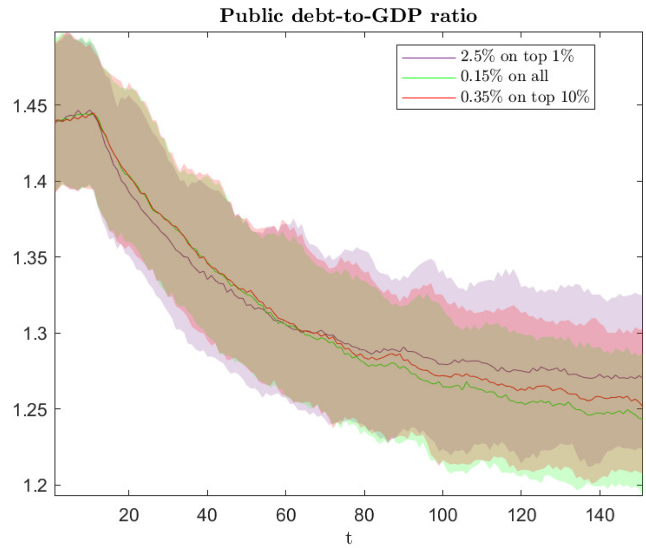

Figure 17. Evolution of public-to-GDP ratio under alternative wealth tax regimes.

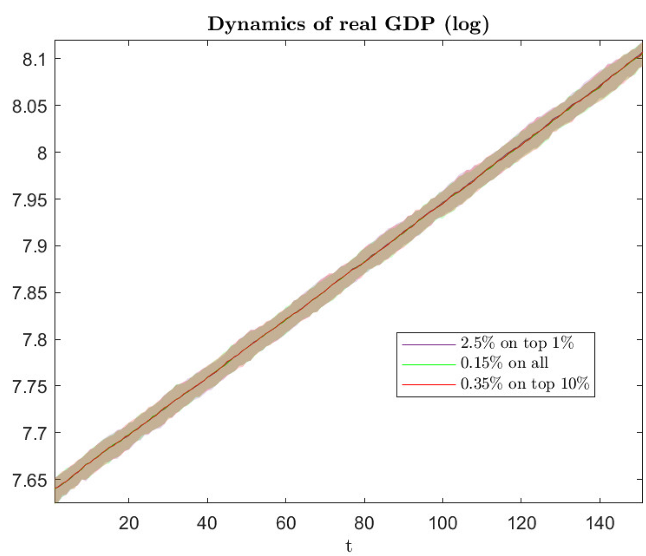

Figure 18. Real GDP dynamics under alternative wealth tax regimes.

wealthy households via commercial banks' loans to defaulting households that were previously securitized and used for the production of ABSs.

In the end, given fiscal consolidation's goals in terms of "desired" reduction in the stock of public debt, it is up to the government to decide which type of wealth tax regime to adopt according to its own political preferences. Figures 17 and 20 jointly indicate that a lower level of the public debt-to-GDP ratio can be equally achieved in a more or less equitable way depending on governmental decision about who will be liable to pay the wealth tax.

4.3 Fiscal policy implication of securitization

The "financial side of financialization" (Caverzasi et al., 2019), namely securitization and the production of structured financial products, is a distinguishing feature of the economy described

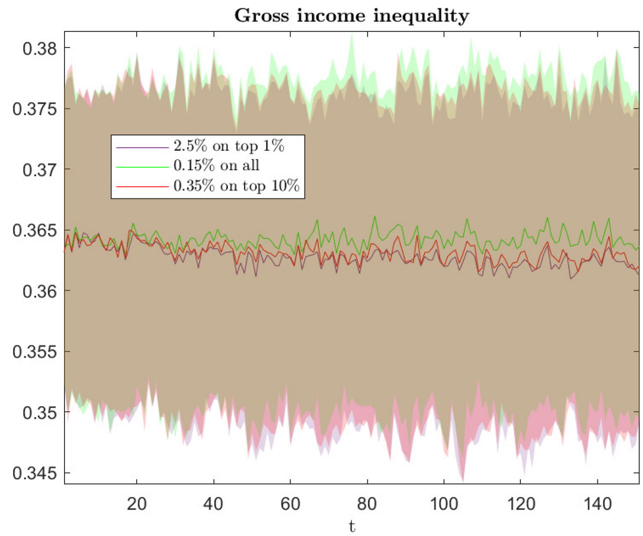

Figure 19. Evolution of income inequality under alternative wealth tax regimes.

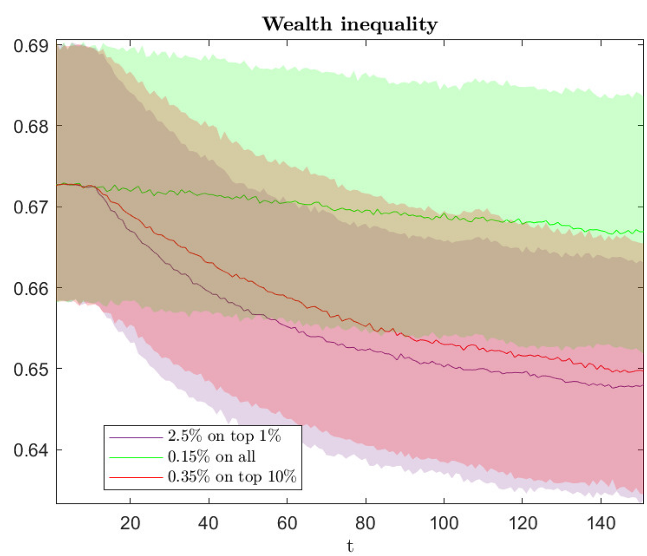

Figure 20. Evolution of wealth inequality under alternative wealth tax regimes.

in this paper. It represents a structural change in the way financial system works with relevant implications on income and wealth inequality (Botta et al., 2021; Botta et al., 2022). More than this, it influences the functioning of the economy as a whole (Botta et al., 2024). The simulations we describe in the present Section are meant to clarify this last point. We compare two different cases, one in which securitization is allowed (purple lines in Figures 21–26 below) and one in which it is not (light blue lines). We focus on the implications of securitization on public finances and, hence, on the implementation of the alternative fiscal strategies described so far. For the sake of space and clarity, we present a few figures on real GDP dynamics (in logs) and the evolution of public debt-to-GDP ratio per each scenario. Figures 21–22 refer to the Baseline with and without securitization. Figures 23–24 show what happens to the economy (to the above-mentioned variables, more precisely) when the SBFR is adopted in the two different "financial systems".

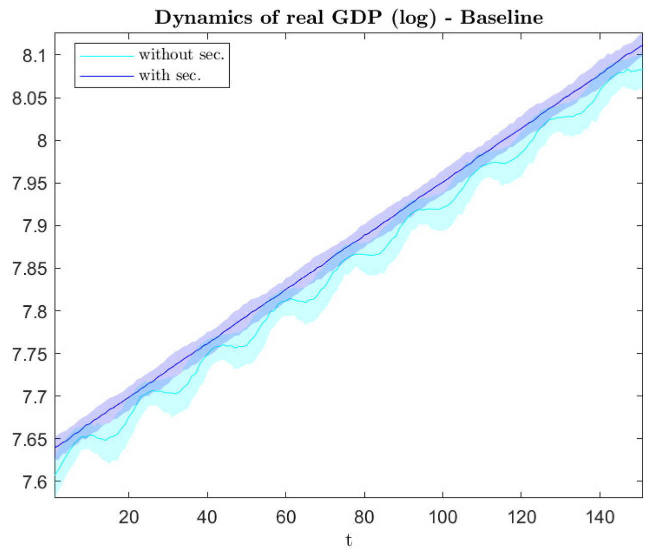

Figure 21. Real GDP *with* (purple line) and *without* (light blue line) securitization in the baseline.

Figures 25–26, finally, present the case of the (benchmark) wealth tax (namely, 0.35% on the top 10% wealthiest households).

Figure 21 somehow portrays the possible virtues of securitization. Consistent with Jorda et al. (2017), securitization may stimulate slightly faster and, above all, more stable growth with respect to an economy without securitization. This is due to the higher and more stable amount of credit that securitization allows commercial banks to extend to the economy, thus possibly smoothing "normal" business cycles out[20]. These benefits do not come without costs though. As already discussed in Botta et al. (2024), securitization forces the central bank to pursue a permanently more restrictive monetary policy stance in order to keep inflation under control. This in turn reverberates into a substantially higher public debt burden (with respect to the "no securitization" environment). This is primarily caused by the tougher interest rate "bill" the government has to pay on accumulated debt.

What if the domestic government responds to allegedly too-high public debt by implementing spending-based fiscal austerity? Figures 23 and 24 show that the possible pro-growth effects of securitization are reverted when it is coupled with the SBFR. Indeed, in the SBFR scenario, the economy displays a more stable growth pattern and a level of real GDP that is generally higher when securitization is absent. This is due to the fact that the higher public deficit and public debt characterizing the "securitization" environment make the SBFR more binding than in the "no securitization" case. Whilst the SBFR eventually succeeds in bringing public debt down in the long run thanks to the interaction with monetary policy, it also makes the economy more volatile. In the "no securitization" case instead, spending cuts are less stringent, thus jeopardizing economic dynamics less. In this case, since lower public deficits may often leave the SBFR inactive, there are no significant reductions in the level of public debt with respect to the Baseline. However, its evolution becomes more stable fluctuating around 105 percent of GDP.

[20] To be sure, securitization may significantly contribute to feed asset bubbles, housing bubbles in particular, and expose the economy to tail financial risks, as Jorda et al. (2017) themselves recognize. In the present paper, we are not interested in studying such eventuality, which will likely modify the political-economic environment in which fiscal and monetary policies are defined. Unconventional policies adopted in the aftermath of the GFC are a clear example of this. Here we rather focus on how securitization may modify the implementation of and interaction between fiscal and monetary policy in "normal times". It is also for this reason that we try to keep the present model as simple as possible and we do not consider economic sectors such as the real estate that are more likely affected by potentially disruptive boom-and-bust cycles.

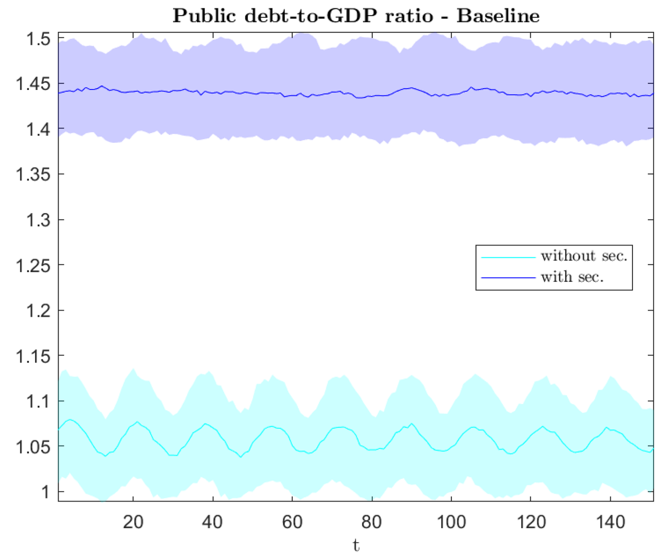

Figure 22. Public debt-to-GDP ratio *with* (purple line) and *without* (light blue line) securitization in the baseline.

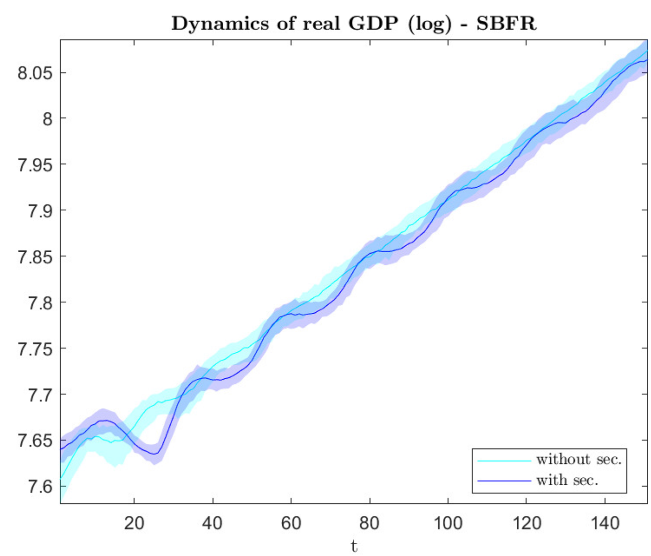

Figure 23. Real GDP *with* (purple line) and *without* (light blue line) securitization in the SBFR scenario.

Figures 25 and 26 move the attention to the WT scenario. The introduction of the WT prompts a reduction of public debt in both the "securitization" and "no securitization" case. In the latter, despite some volatility, the public-debt-to-GDP ratio progressively declines to values below 100 percent of GDP. More importantly, the WT seems to preserve the possible pro-growth virtues of securitization whilst consolidating the fiscal position of the government. In the WT scenario, much like in the Baseline, the economy records slightly higher and more stable values of real GDP when securitization is present with respect to when it is not. In a way, this result suggests that there may be an intrinsic trade-off in modern financialized economies between securitization and, say, "conventional" fiscal consolidation programs centered on cuts to public spending. If governments and regulators want to maintain securitization-related practices in place, with the

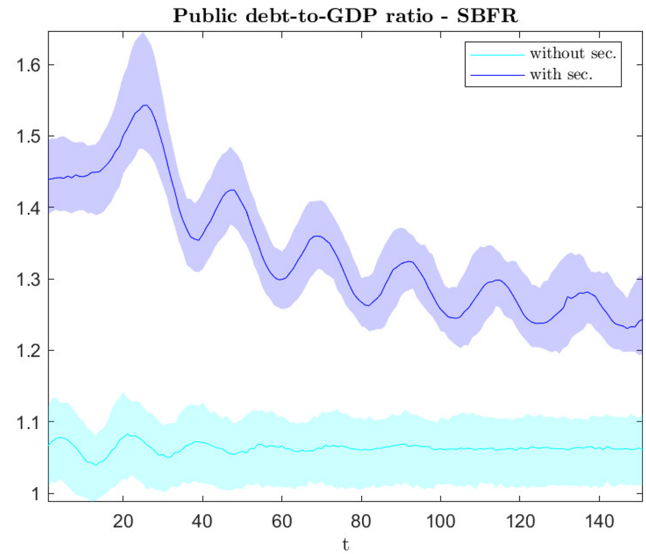

Figure 24. Public debt-to-GDP ratio *with* (purple line) and *without* (light blue line) securitization in the SBFR scenario.

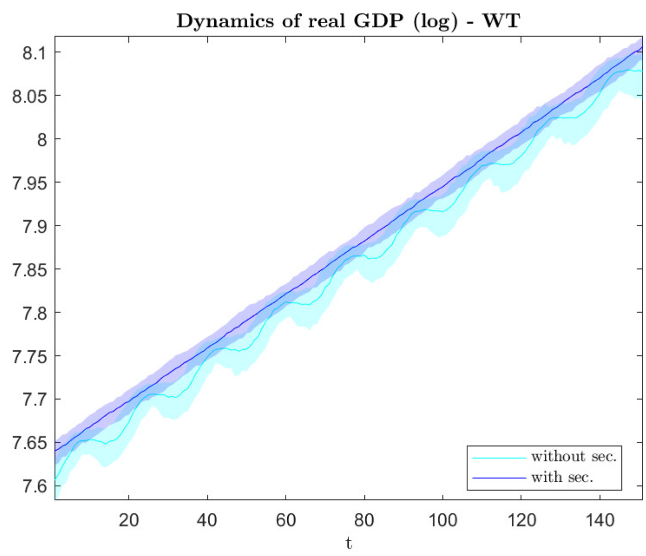

Figure 25. Real GDP *with* (purple line) and *without* (light blue line) securitization in the WT scenario.

ensuing effects over the macroeconomy, and, at the same time, ensure fiscal sustainability, the introduction of some form of taxation on wealth is the way to prefer with respect to SBFRs.

In the end, when thinking about the return to fiscal "normality" after a protracted period of relaxed fiscal rules, this cannot be the same as it was before Covid and the GFC. In an increasingly unequal financialized world, wealthy people cannot keep the cake (read securitization with its rentier-friendly outcomes) and eat it too (i.e., do not pay for their augmented "privileges")! If the governments want to return to normality, also wealthy people have to contribute to it.

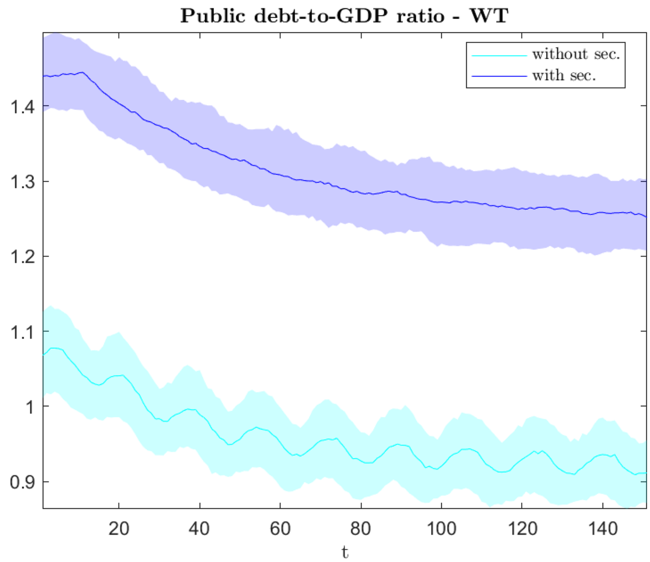

Figure 26. Public debt-to-GDP ratio *with* (purple line) and *without* (light blue line) securitization in the WT scenario.

5. Policy discussion and future research

In this paper, we suggest that, whenever there is a political quest, justified or not, for fiscal consolidation, this should be implemented via wealth taxation on wealthy households rather than via cuts to public purchases. This result emerges from a fairly simple demand-driven mechanism. Cuts to primary non-cyclical public purchases directly hit a relevant component of aggregate demand. By depressing demand, they induce firms to reduce production and cause unemployment to rise, with second-round depressionary outcomes over private consumption and investment. Whilst the ensuing economic contraction may well frustrate fiscal consolidation's attempts of reducing public debt, it may even hit back on the financial holdings of wealthy households, whose assets have been created with the securitized loans of low-middle income ones. This is much less the case of a wealth tax given the considerably lower propensity to consume out of wealth and financial income through which it might indirectly affect aggregate demand. We obtain these results via a fairly complex AB-SFC closed economy model that still adopts a quite simplistic representation of the public sector. Two further considerations are in order here.

First, we focus on the macro-aggregated level of public purchases, but we do not consider the complexity of the public sector itself and the several functions that the public sector actually performs via public purchases. Many of these functions have positive implications for growth that go beyond pure demand-side mechanisms. One can think about the positive "crowding-in" effects that public investment may generate over private investment (Dutt, 2013), for instance. Alternatively, think about the role of public spending in education in building up human capital, and the role that human capital in turn plays into national innovation systems when it comes to the generation of innovation and absorptive capabilities (Castellacci and Natera, 2013). Finally, one can also recall the literature about the so-called "Entrepreneurial State" (Mazzucato, 2013), and the positive effects of public R&D over private ones by creating new technologies and sectors that would have never come to light without initial public intervention (Deleidi and Mazzuccato, 2021). In all these cases, cuts to public spending that impinge upon public sector's capacity to carry out such activities will likely have far deeper negative consequences on the performance and stability of the economy than those portrayed in our paper. Not only the level, but also the growth rate of real GDP may get permanently reduced by spending-based austerity.

Second, we carry out our analysis in the context of a closed economy. This implies that we neglect to consider (i) the possible effects of spending-based austerity on economic dynamics via the external channel, i.e., by affecting home economy's international competitiveness and (net) export performance; (ii) the possible impediments to the implementation of a wealth tax set by international capital mobility. These aspects certainly represent relevant areas for future research. Nonetheless, some observations can already be advanced. As to the external channel through which spending-based austerity might possibly lead to expansionary outcomes, it might have been at work in the past in the case of some small open economies such as Ireland and Denmark in the 1980s, and Sweden and Finland in the 1990s. In these cases, however, substantial depreciation of their exchange rate preceded spending cuts. By curbing domestic inflation, spending-based austerity may have contributed to stimulate net exports by preserving, more than generating, improvements in external competitiveness. These were actually achieved before by other means. And alleged (expansionary) austerity's positive effects over firms' expectations were possible only when spending cuts were associated with other policies, such as the exchange rate policy, that boosted aggregate demand via net exports. Last but not least, this combination of events is unlikely to happen in highly integrated economies that *simultaneously* embark on spending-based fiscal adjustments. A perverse example of "fallacy of composition" will more likely take place, with each country's austerity undermining fiscal improvements in the others (Blyth, 2013).

High international capital mobility and fiscal heavens may certainly constrain the capability of each single country, taken alone, to impose higher taxes on wealthy households. Provided that some form of international harmonization/coordination in fixing minimum taxation levels is more than welcomed, these challenges seem to be more compelling for income taxes, taxes on profits in particular, than wealth taxes. In fact, from a theoretical point of view, a tax on financial wealth could be levied on both domestic assets as well as foreign ones. In the case of the wealth tax, the tax "unit" is represented by the single household itself. People mobility is likely more limited or easier to control than capital's one. Therefore, as far as a household resides in or has the nationality of a certain country, all its financial wealth, wherever held, should be subjected to the wealth taxation regime of that same country. The implementation of this policy would obviously get benefited by improvements in the international regulation about financial disclosure and declaration of financial wealth. But improvements on this front have more to do with legal actions against tax evasion and elusion, rather than the economic incentives to move capital abroad to exploit tax arbitrage. Quite interestingly, all these tasks may be facilitated by significant progresses in the computation of the distributional national accounts (Piketty et al., 2018; Blanchet et al., 2024). These merge data from tax records, micro-level surveys and national accounts to provide a comprehensive, complete and coherent cross-country estimation of income and wealth distribution. International institutions such as the OECD and the UN-Wider now presents databases on the same distributional variables. And the US Federal Reserve elaborates its own distributional financial accounts providing quarterly information about wealth distribution across US households from 1989 onward. The set of information and the toolkit available to governments for the imposition of a wealth tax on wealthy households seem to be richer than ever.

6. Conclusions

After the rise in public debt observed in most advanced economies in the aftermath of the 2007-2008 financial shock and during the pandemic, now there seems to be strong political pressures for the return to a protracted period of fiscal consolidation (BIS, 2023; IMF, 2024). In this paper, we investigate the macro-financial and distributive implications of two alternative fiscal strategies. The first one, centered on the implementation of a *Spending Based Fiscal Rule* (SBFR), pursues the reduction of public debt (to-GDP ratio) via cuts to net primary *non-cyclical* government purchases. The second one consists in the introduction of a wealth tax (WT) that, next to public debt sustainability, aims at tackling increasingly high wealth concentration characterizing today's advanced economic system. Four points are worth stressing.

First, the WT strategy seems to outperform the alternative SBFR one. Indeed, both policies succeed in lowering the public debt-to-GDP ratio in the longer term. However, their short-to-medium-run macro implications differ remarkably. The spending-based fiscal rule, in particular, is initially self-defeating and increases overall economic volatility. Spending cuts actually trigger a vicious cycle in which (primary non-cyclical) public expenditure, employment, bank loans, consumption, and investment all decrease or become more volatile.

Second, the more pronounced cyclical pattern followed by the economy in the SBFR scenario is linked to the interaction between fiscal and monetary policy. In our simulations, fiscal and monetary policy cannot be analyzed separately from one another. In fact, public spending cuts would not be sustainable without an expansionary monetary policy that keeps the economy floating. Given the austerity-led reduction of inflation, it is the decrease in the central bank's policy rate that softens the economic downfall, tames the credit crunch, improves the fiscal balance (by reducing the interest bill on public debt), and ultimately opens space for (at least partial) recovery. In this sense, a crucial aspect of our model is that the interest rate on public bonds is linked to central bank's policy rate, whilst financial market mechanisms play a more limited role. With completely market-driven interest rates, debt service costs would likely rise alongside increasing public debt-to-GDP ratios, exacerbating unstable dynamics in the SBFR scenario.

Third, whilst public spending cuts cause income inequality to rise with respect to the WT strategy, they (somehow surprisingly) lead to similar reductions in wealth inequality. In the SBFR scenario, this reduction is due to capital losses suffered by wealthy households on financial assets created with the securitization of loans extended to low-middle income ones. In a financialized economy, the aversion that wealthy households may have, a priori, against the wealth tax and in favor of public spending cuts may be ungrounded.

Connected to the previous point, public spending cuts also seem to cancel out the positive effects that securitization may possibly have on growth across normal business cycles. In the end, in modern financialized economies, there may be an intrinsic trade-off between securitization and fiscal consolidation programs based on public spending cuts. Wealth taxation may represent an effective solution to combine securitization's effects on growth with sound public finances.

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Appendix A
Parameters

Table A1. Parameters

Symbol	*Description*	*Baseline*
α	Sensitivity in public bonds' interest rate setting	0.01
β	Weight of CDO-bond spread in IF portfolio allocation	100
γ_1	Autonomous component desired capital growth	0.1
γ_2	Sensitivity to profit rate, capital growth	0.1
γ_3	Sensitivity to capacity utilization share, capital growth	0.3
δ	Capital depreciation rate	0.1
ϵ	Quota of the principle, debt service	0.1
ζ_B	Rate of adjustment, banks' own capital	0.1
η_F	Firms desired deposits to capital ratio	0.25
η_H	Households desired deposits, quota of wealth	0.25
η_{IF}	Investment funds desired deposits, quota of wealth	0.25
θ	Log-standard deviation (wage distribution)	0.5
ι_f	Sensitivity to the debt service ratio, Firms interest rate setting	0.1
ι_b	Sensitivity to the debt service ratio, HH interest rate setting	0.3
μ_1	Autonomous mark-up on costs (price determination)	0.15
μ_{MAX}	Ceiling mark-up on costs (price determination)	0.3
ξ	Sensitivity to consumption (public purchases)	0.6
π^T	Inflation threshold	0.4
ρ	Degree of 'gradualism', interest rate target setting	0.8
ρ_π	Sensitivity to inflation gap, interest rate target setting	0.8
σ	Sensitivity to return on share/base rate spread, household portfolio choice)	5
τ_1^w	Tax rate on lower income	0.2
τ_2^w	Tax rate on higher income	0.45
τ_π	Tax rate on profit (firms and banks)	0.3
υ_1	Sensitivity to production gap, firms desired supply	0.5
υ_2	Exp production autonomous growth	0.05
ϕ	Threshold recursive process, interest rate setting	0.01
χ_1^L	Productivity autonomous growth	0.003
χ_2^L	Demand led productivity growth	0.05
ψ_1	Sensitivity to NPI (threshold for debt service ratio)	0.1
ψ_2	Sensitivity to distance from regulatory limits (threshold for debt service ratio)	0.1
Ψ_{min}	Lower limit, threshold for debt service ratio	0.05
Ψ_{max}	Upper limit, threshold for debt service ratio	1/3
ω_1	Wage inflation sensitivity to unemployment (numerator)	0.005
ω_2	Wage inflation sensitivity to unemployment (denominator)	0.05
ω_3	Wage inflation sensitivity to labor productivity	0.5
c_n	'Socially determined' consumption	0.3
c_r	Propensity to consume out of financial income	0.40
c_w	Propensity to consume out of net wage income	0.65
$\underline{k}$	Regulatory limit for leverage	0.08

Appendix B

Equations

Firms

$$X_t^L = X_{t-1}^L \cdot \left[\chi_1^L + \chi_2^L \cdot \left(\frac{Y_{D,t}^*}{Y_{D,t-1}^*} - 1\right)\right] \tag{B1}$$

$$Y_D^* = \frac{(C_t^* + p_t \cdot I^* + G^*)}{p_t} \tag{B2}$$

$$X^K = \bar{X}^K \tag{B3}$$

$$Y_S^* = [Y_{S,t-1}^* + \upsilon_1 \cdot (Y_{D,t-1}^* - Y_{S,t-1}^*)] \cdot (1 + \upsilon_2) \tag{B4}$$

$$Y_K^{MAX} = K_{t-1} \cdot X^K \tag{B5}$$

$$Y_L^{MAX} = \bar{N} \cdot X_t^L \tag{B6}$$

$$Y^{MAX} = min(Y_K^{MAX}, Y_L^{MAX}) \tag{B7}$$

$$Y_S = \begin{cases} \text{if } Y_S^* & \leq Y^{MAX} \Longrightarrow Y_S = Y_S^* \\ \text{if } Y_S^* & > Y^{MAX} \Longrightarrow Y_S = Y^{MAX} \end{cases} \tag{B8}$$

$$N_t = \frac{Y_S}{X_t^L} \tag{B9}$$

$$u_t = \frac{Y_S}{X^K K_{t-1}} \tag{B10}$$

$$Un_t = \bar{N} - N_t \tag{B11}$$

$$un_t = \frac{Un_t}{\bar{N}} \tag{B12}$$

$$\omega_t = (\pi_{t-1}) \cdot \left[\frac{\omega_1}{(\omega_2 + un_t)} + \omega_3 \cdot \frac{X_t^L - X_{t-1}^L}{X_{t-1}^L}\right] \tag{B13}$$

$$W_t = W_{t-1} \cdot \left[1 + \omega_t + (\frac{N_t}{N_{t-1}} - 1)\right] \tag{B14}$$

$$g_t^* = \gamma_1 + \gamma_2 \frac{\Pi_{t-1}}{Y_{t-1}} + \gamma_3(u_{t-1} - u_N) \tag{B15}$$

$$I_t^* = K_{t-1} \cdot g_t^* \tag{B16}$$

$$K = K_{t-1} + I_t - \delta K_{t-1} \tag{B17}$$

$$\mu_t = max\left(\mu_{MAX}, \mu_1 + \mu_{t-1} \cdot \frac{Y_{D,t-1}^*}{Y_{S,t-1}}\right) \tag{B18}$$

$$p_t = \frac{W_t + i_{t-1}^f \cdot Lf_{t-1}}{Y_S} \cdot (1 + \mu_t) \tag{B19}$$

Households

$$yd_{i,t} = w_{i,t} - tax_{i,t}^w + rsh_{t-1} \cdot Sh_{i,t-1} + Div_{i,t-1} - i_{i,t-1}^h \widetilde{\cdot Lh}_{i,t-1} \tag{B20}$$

$$r_{i,t}^{sh} = z \cdot (r_{t-1}^f \cdot L_{f,t-1} + \sum r_{t-1}^f \cdot Lh_{i,t-1}) \cdot \frac{1}{Sh_{t-1}} \tag{B21}$$

$$tax_{i,t}^w = \tau_j^w w_{i,t} \begin{cases} \text{if } w_{i,t} < \hat{w}_t & \Longrightarrow tax^w = \tau_1^w \cdot w_{i,t} \\ \text{if } w_{i,t} \geq \hat{w}_t & \Longrightarrow tax^w = \tau_1^w \cdot \hat{w} + \tau_2^w \cdot (w_{i,t} - \hat{w_t}) \end{cases} \tag{B22}$$

$$c_{i,t}^* = c_w \cdot (yw_{i,t}) + c_r \cdot [r^{sh} \cdot Sh_{i,t} + Div_{i,t}] + c_{wealth} \cdot (NW_{i,t}) + c_n \cdot \bar{c}_{t-1} \tag{B23}$$

$$s_{i,t}^* = yd_{i,t} - c_{i,t}^* \tag{B24}$$

$$Dh_{i,t}^* = \eta_H \cdot Wh_{i,t-1} \tag{B25}$$

$$\Delta Dh_{i,t}^* = Dh^* - Dh_{i,t-1} \tag{B26}$$

$$Sh^*_{i,t} = Sh_{i,t-1} \cdot [1 + \sigma(\frac{r^{sh}_{t-1} Sh_{i,t-1}}{Sh_{i,t-1}} - i^B_{i,t-1})] \tag{B27}$$

$$\Delta Sh^*_{i,t} = Sh^*_{i,t} - Sh_{i,t-1} \tag{B28}$$

$$\Delta Lh^*_{i,t} = \Delta Dh^*_{i,t} + \Delta Sh^*_{i,t} - S^*_{i,t} \tag{B29}$$

$$\text{if } m^*_{i,t} < \Psi_t \Longrightarrow \begin{cases} \Delta Lh_{i,t} = & \Delta Lh^*_{i,t} \\ \Delta Sh_{i,t} = & \Delta Sh^*_{i,t} \\ \Delta Dh_{i,t} = & \Delta Dh^*_{i,t} \\ c_{i,t} = & c^*_{i,t} \end{cases} \quad WH_{i,t} \qquad = Dh_{i,t} + Sh_{i,t} \tag{B30}$$

$$\text{if } m^*_{i,t} > \Psi_t \Rightarrow Lh_{i,t} = 0 \Rightarrow \begin{cases} \text{if } s^*_{i,t} > \Delta Dh^*_{i,t} \Rightarrow \begin{cases} \Delta Sh_{i,t} > 0 \\ \Delta Sh_{i,t} = s^*_{i,t} - \Delta Dh^*_{i,t} \\ \Delta Dh_{i,t} = \Delta Dh^*_{i,t} \\ c_{i,t} = c^*_{i,t} \end{cases} \\ \text{if } s^*_{i,t} < \Delta Dh^*_{i,t} \text{and } s^*_{i,t} + Sh_{i,t-1} > \Delta Dh^*_{i,t} \Rightarrow \begin{cases} \Delta Sh_{i,t} < 0 \\ \Delta Sh_{i,t} = s^*_{i,t} - \Delta Dh^*_{i,t} \\ \Delta Dh_{i,t} = \Delta Dh^*_{i,t} \\ c_{i,t} = c^*_{i,t} \end{cases} \\ \text{if } s^*_{i,t} + Sh_{i,t-1} < \Delta Dh^*_{i,t} \text{and } s^*_{i,t} + Sh_{i,t-1} > 0 \Rightarrow \begin{cases} Sh_{i,t} = 0 \\ \Delta Sh_{i,t} = -Sh_{i,t-1} \\ \Delta Dh_{i,t} > 0 \\ \Delta Dh_{i,t} = s^*_{i,t} + Sh_{i,t-1} \\ c_{i,t} = c^*_{i,t} \end{cases} \\ \text{if } s^*_{i,t} + Sh_{i,t-1} < 0 \text{and } s^*_{i,t} + Sh_{i,t-1} + Dh_{i,t-1} > 0 \Rightarrow \begin{cases} Sh_{i,t} = 0 \\ \Delta Sh_{i,t} = -Sh_{i,t-1} \\ \Delta Dh_{i,t} < 0 \\ \Delta Dh_{i,t} = s^*_{i,t} + Sh_{i,t-1} \\ c_{i,t} = c^*_{i,t} \end{cases} \\ \text{if } s^*_{i,t} + Sh_{i,t-1} + Dh_{i,t-1} < 0 \Rightarrow \begin{cases} Sh_{i,t} = 0 \\ \Delta Sh_{i,t} = -Sh_{i,t-1} \\ Dh_{i,t} = 0 \\ \Delta Dh_{i,t} = -Dh_{i,t-1} \\ c_{i,t} \geq \tilde{c} \\ c_{i,t} = yd_{i,t} + Sh_{i,t-1} + Dh_{i,t-1} \end{cases} \end{cases} \tag{B31}$$

Government

$$G_t = \xi_1 \cdot G_{t-1} + (1 - \xi_1) \cdot \xi_2 \cdot C_t \tag{B32}$$

$$T_t = \tau_\pi \cdot \Pi_t + \sum_{i=1}^{N} \tau_i^w w_{i,t} + \sum_{i=1}^{N} \tau_i^{WH} WH_{i,t-1} \tag{B33}$$

$$\Delta GD_t = G_t + dole \cdot [\bar{N} - N_t] + i_{t-1}^b \cdot GD_{t-1} - T_t \tag{B34}$$

$$i_t^b = i_{t-1}^b \cdot [1 + \alpha(\frac{B_{B,t}}{GD_t} - \frac{B_{B,t-1}}{GD_{t-1}})] \tag{B35}$$

Commercial Banks

$$i_{i,t}^{e,h} = i_{t-1}^T + \iota_h \cdot i_{t-1}^T \cdot \frac{Lh_{i,t-1} + \Delta Lh_{i,t}^*}{yn_{i,t}} \tag{B36}$$

$$i_t^f = i_{t-1}^T + \iota_f \cdot i_{t-1}^T \cdot \frac{Lf_{t-1} + \Delta Lf_t}{Pf_t} \tag{B37}$$

$$mh_{i,t}^* = i_{i,t}^{e,h} \cdot \frac{Lh_{i,t-1} + \Delta Lh_{i,t}^*}{yn_{i,t}} \tag{B38}$$

$$\Psi_t = max\left[\Psi_{min}, min(\Psi_{max}, \Psi^*)\right] \tag{B39}$$

$$\Psi^* = \bar{\Psi}_{min} - \psi_1 \cdot \frac{NPL}{\epsilon \cdot Lh_{t-1}} + \psi_2 \cdot (k_{B,t} - \bar{k}) \tag{B40}$$

$$k_{B,t} = \frac{\widetilde{\Omega}_{t-1}^B}{[(1 - z_t)L_t + B_{B,t}]} \tag{B41}$$

$$\widetilde{\Omega}_t^B = \Omega_{t-1}^B - (1 - z_{t-1}) \cdot NPL_t \tag{B42}$$

$$\text{if } mh_{i,t}^* < \Psi_t \text{then } i_{i,t}^h = i_{i,t}^{e,h} \text{and } \Delta Lh_{i,t} = \Delta Lh_{i,t}^* \tag{B43}$$

$$P_t^B = \Pi_t^B (1 - \tau_\pi) \tag{B44}$$

$$\bar{\Omega}_t^B = \left[(1-z)L_t + B_{B,t}\right] \cdot \overline{k} \tag{B45}$$

$$\Delta\Omega_t^* = \begin{cases} \text{if } k_{B,t} & < \bar{k} \Longrightarrow \Delta\Omega_t^* = \zeta_B \cdot (\bar{\Omega}_t^B - \Omega_{t-1}^B) \\ \text{if } k_{B,t} & \geq \bar{k} \Longrightarrow \Delta\Omega_t^* = 0 \end{cases} \tag{B46}$$

$$\text{if } \Delta\Omega_t^* \leq P_t^B \Longrightarrow \begin{cases} \Omega_t = \Omega_{t-1} + \Delta\Omega_t^* \\ Div_B = P_t^B - \Delta\Omega_t^* \end{cases} \tag{B47}$$

$$\text{if } \Delta\Omega_t^* > P_t^B \Longrightarrow \begin{cases} \Omega t = \Omega_{t-1} + P_t^B \\ Div_B = 0 \end{cases} \tag{B48}$$

$$B_{B,t} = GD_t - B_{IF,t} \tag{B49}$$

$$RL_{B,t}^h t = \sum_{i=1}^{N} (1 - z_{t-1}) \cdot [i_{i,t-1}^h \widetilde{\cdot Lh}_{i,t-1}] \tag{B50}$$

$$RL_{B,t}^f = (1 - z_{t-1}) \cdot [i_{t-1}^f \cdot Lf_{t-1}] \tag{B51}$$

$$RB_{B,t} = i_{t-1}^b \cdot B_{B,t-1} \tag{B52}$$

$$\Pi_{B,t} = RL_{B,t}^h + RL_{B,t}^f + RB_{B,t} \tag{B53}$$

$$ABS_{if,t} = z_t \cdot \sum_{i=1}^{N} Lh_{i,t} + z_t \cdot Lf_t \tag{B54}$$

$$z_t = min(1, \frac{ABS_{IF}}{L_t}) \tag{B55}$$

$$r_t^{abs} = \frac{z_t[(\sum_{i=1}^N i_{i,t-1}^h \widetilde{\cdot Lh}_{i,t-1}) + i_{t-1}^f Lf_{t-1}]}{ABS_{if,t-1}} \tag{B56}$$

Investment Funds

$$D_{IF,t} = \eta_{IF} \cdot Sh_t \tag{B57}$$

$$q^b_{if,t} = q^b_{if,t-1} \cdot \{1 - \beta[(r^{abs}_t - i^B_t) - (r^{abs}_{t-1} - i^B_{t-1})]\} \tag{B58}$$

$$B^D_{IF,t} = q^b_{if,t} \cdot (1 - \eta_{IF}) \cdot Sh_t \tag{B59}$$

$$ABS^{*D}_{IF,t} = Sh_t \cdot (1 - \eta_{IF}) - B_{IF,t} \tag{B60}$$

$$ABS^{*}_{IF,t} = min(z_t L_t, ABS^{D*}_{IF,t}) \tag{B61}$$

$$RABS_{IF,t} = r^{abs}_{t-1} \cdot ABS_{t-1} \tag{B62}$$

$$RB_{IF,t} = i^B_{t-1} \cdot B_{IF,t-1} \tag{B63}$$

$$RSH_t = RABS_{IF,t} + RB_{IF,t} \tag{B64}$$

$$r^{sh}_{i,t} = RSH \cdot \frac{sh_{i,t-1}}{SH_{t-1}} \tag{B65}$$

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