

Endogenous Autonomous Demand and the Supermultiplier: The Return of the Paradoxes of Thrift and Cost?^{*}

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Abstract

This paper examines the relationship between functional income distribution, autonomous non-capacity-creating demand, and long-run growth within the Sraffian Supermultiplier (SSM) framework. While the SSM has emerged as an influential strand of post-Keynesian growth theory by reconciling exogenous functional income distribution, convergence toward normal capacity utilization, and the long-run independence of investment from saving, the determinants of autonomous non-capacity-creating demand—the central driver of long-run growth within the framework—remain insufficiently explored. This paper addresses this gap by systematically reviewing the theoretical and empirical literature on the determinants of the major components of autonomous demand and deriving functional specifications to endogenize these components. These specifications are subsequently incorporated into a stock-flow-consistent Supermultiplier model (SFC-SSM) to examine how distributional dynamics affect long-run growth rates. The results suggest that the properties of the canonical Supermultiplier model remain broadly robust when autonomous demand is endogenized, although several important qualifications emerge. First, consumption out of wealth should not be regarded as a genuine component of autonomous demand. Second, only deficit-financed government expenditure should be considered autonomous demand in the SSM sense, whereas “tax-financed” spending merely redistributes purchasing power. Third, debt dynamics during the traverse may prevent convergence to a new long-run equilibrium, even if that equilibrium would be characterized by stable debt-to-income ratios. Overall, the paper contributes to a more comprehensive understanding of autonomous demand and highlights the importance of integrating distributional and financial mechanisms into SSM growth theory.

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1 Introduction

The post-Keynesian research agenda in macroeconomics is built upon the rejection of Say's law. While convincing attempts to replace Say's law with the principle of effective demand were already put forward by the founding fathers of post-Keynesian economics, Keynes and Kalecki, the Sraffian Supermultiplier, first proposed by Serrano (1995), represents the most recent of three major approaches within post-Keynesian economics that seek to extend the Keynesian rejection of Say's law to the long run. The first of these approaches is commonly associated with its most prominent proponents, Nicholas Kaldor and Joan Robinson, and emerged in Cambridge in the immediate aftermath of Keynes's work there. The second approach draws inspiration from Michal Kalecki's emphasis on functional income distribution and entered the debate as the Kalecki-Steindl (or neo-Kaleckian) approach.

Demonstrating that an economy is genuinely demand-led in the long run requires showing that capital accumulation is not constrained by the saving rate, meaning that saving adjusts to whatever investment rate firms choose. All three approaches attempt to provide such a mechanism, although they differ in the adjustment processes through which the saving rate accommodates the investment rate (Hein 2024).

A second crucial condition for demand-led growth, emphasized by Serrano (1995, p. 71), is that at least one component of aggregate demand must be treated as an independent variable that is not induced by the circular flow of income and is therefore "completely independent from the 'supply' side (i.e. output and capacity) of the economy". If all demand components were income-dependent and thus ultimately determined by production, an endogeneity problem would arise that would make causal identification impossible (Serrano 1995).

The Cambridge-Keynesian and Kaleckian approaches assign the role of the independent demand factor to investment (Cesaratto 2015; Hein 2024). In Cambridge-Keynesian models, the adjustment of saving to investment occurs through an endogenous functional income distribution, which determines the aggregate propensity to save (Serrano and Freitas 2017b; Dejuán 2017). In contrast to the Cambridge-Keynesian approach, the Kaleckian approach treats functional income distribution as exogenous, determined through some form of cost-plus pricing even in the long run (Hein 2023b). Rather than adjusting prices (and thus functional income distribution), firms are assumed to respond to fluctuations in demand through quantity adjustments. This makes the rate of capacity utilization the endogenous adjustment variable (Cesaratto 2015; Serrano and Freitas 2017b; Hein 2023b).

Both the Cambridge-Keynesian and the Kaleckian approaches have been criticised for the implausibility of their respective mechanisms for adjusting the saving rate to the investment rate. In the case of Cambridge models, the endogeneity of functional income distribution is disputed on both theoretical and empirical grounds (Cesaratto 2015; Serrano and Freitas 2017b). In the case of Kaleckian models, the endogeneity of the rate of capacity utilization and the absence of long-run convergence towards some form of normal rate of utilization have been questioned

from a microeconomic perspective (Morlin et al. 2024; Serrano et al. 2023). Consequently, both the Cambridge-Keynesian and Kaleckian approaches are trapped within what Cesaratto (2015) terms the “Inconsistency Growth Triangle”: both approaches fail to reconcile the long-run validity of the Keynesian hypothesis of the independence of investment from saving with exogenous functional income distribution and a normal long-run rate of capacity utilization.

The Supermultiplier approach offers a way out of the inconsistency growth triangle. Building on Matthews (1959)’s “capital stock adjustment principle”, proponents of the Supermultiplier model treat investment as fully induced by aggregate demand (Serrano 1995; Serrano et al. 2023) and introduce the notion of non-capacity-creating components of aggregate demand. Such components are generally defined as expenditures “(whether formally classified as consumption or as ‘investment’) that are neither financed by the contractual (wages and salary) incomes generated by production decisions, nor are capable of affecting the productive capacity of the capitalist sector of the economy” (Serrano 1995, p. 71). According to this definition, proponents of the SSM argue that credit-financed consumption, consumption out of wealth, residential investment, certain expenditures by firms that are neither capacity-creating nor financed out of retained profits, public expenditure, and exports qualify as autonomous non-capacity-creating demand (Serrano 1995).

Introducing autonomous demand components has the important advantage of partially decoupling the saving *share* (the average propensity to save) from the aggregate *marginal* propensity to save and, therefore, from functional income distribution (Cesaratto 2015; Serrano and Freitas 2017b). Distribution and marginal saving propensities continue to influence the saving share, but these effects can be offset by changes in the ratio of autonomous demand to aggregate income, since autonomous demand constitutes dissaving: by definition, it must be financed either by running down financial assets or by accumulating liabilities. This provides the adjustment mechanism through which proponents of the Supermultiplier approach reconcile saving with investment while maintaining both the Keynesian hypothesis and exogenous income distribution, alongside long-run normal capacity utilization (Serrano and Freitas 2017b).

The literature on the Supermultiplier approach thus generally concludes that the Keynesian-Kaleckian paradoxes of thrift and costs do not hold in the long run. While changes in saving propensities and income distribution continue to exert short-run level effects through their influence on the supermultiplier—and thus affect *average* rates of utilization and accumulation, as emphasized by Lavoie (2016), Serrano and Freitas (2017b), and Gallo (2026)—long-run rates of utilization and accumulation appear to remain unaffected (Serrano and Freitas 2017b).

This conclusion rests on the assumption that the growth rate of the autonomous components of aggregate demand is also unaffected by functional income distribution. Potential links between functional income distribution and autonomous demand components—and, consequently, between distribution and the determinants of long-run growth rates—have not yet received broad academic attention. Notable exceptions include Avritzer and Brochier (2025), Avritzer and Goes (2023), Brochier and Macedo e Silva (2019), Fiebiger (2024), Caminati and Sordi (2019),

and, to some extent, Morlin and Pariboni (2023). In fact, most studies dealing with the Supermultiplier sidestep the question of what determines autonomous demand, leaving this issue to future research in political economy (Morlin et al. 2024; Freitas and Serrano 2015). This neglect has prompted criticism of the SSM approach, with some scholars questioning the very existence of autonomous demand (Nikiforos 2018).

This paper aims to fill this gap in the literature by systematically examining the links between functional income distribution and the components of autonomous non-capacity-creating demand. More broadly, the paper seeks to demonstrate how components of autonomous demand can be meaningfully endogenized with respect to functional income distribution and to investigate the effects of such endogenization on long-run growth rates and adjustment dynamics following distributional shocks in Sraffian Supermultiplier models. More specifically, the paper addresses the question of whether the Keynesian paradox of thrift and the Kaleckian paradox of costs can be shown to hold for long-run growth rates when autonomous demand is endogenized with respect to income and income distribution, as outlined above.

To answer these questions, I systematically review both the theoretical and empirical literature on the determinants of the components of non-capacity-creating autonomous demand identified by SSM theory. To the best of my knowledge, this is the first paper to systematically examine all relevant components of autonomous demand in this way.¹ Where the literature suggests an identifiable impact of functional income distribution on autonomous demand, I propose a functional specification to operationalize the potential channels of endogeneity. These specifications are then incorporated into a theoretical stock-flow-consistent (SFC) Supermultiplier model to study the effects of endogenous autonomous demand on long-run growth and adjustment dynamics following shocks to consumption propensities and functional income distribution. Although the endogenization of autonomous demand is informed by the empirical literature, the methodological approach of this paper remains purely theoretical. Empirical testing of the proposed endogeneity specifications would constitute a valuable avenue for future research but lies beyond the scope of this paper.

The remainder of this paper is structured as follows. Section 2 provides a brief overview of the canonical Supermultiplier model, as well as subsequent extensions and critiques. Section 3 focuses on the components of autonomous non-capacity-creating demand that determine long-run economic growth in a Supermultiplier model and discusses which of these components might be influenced by functional income distribution and in what ways. Where partial endogenization of an autonomous demand component with respect to functional income distribution is possible, Section 4 examines its effects in simulated Supermultiplier models. Section 5 discusses the results of the simulations presented in Section 4 and reflects on their broader implications for the SSM approach and post-Keynesian growth theory. Section 6 concludes.

¹The analysis of "non-capacity-creating business investment" is omitted here, as it appears to be quantitatively negligible compared to other components of autonomous demand.

2 The Supermultiplier Model

The canonical version of the Sraffian Supermultiplier Model (SSM) was developed by Freitas and Serrano (2015) and Serrano and Freitas (2017b), building on the pathbreaking contribution of Serrano (1995). In what follows, I present a slightly simplified version of the canonical SSM proposed by Freitas and Serrano (2015) and Serrano and Freitas (2017b), abstracting from time subscripts and depreciation².

As discussed in the previous section, one of the defining assumptions that distinguishes the SSM from other post-Keynesian macroeconomic models is its treatment of investment as a fully induced component of aggregate demand, meaning that investment is entirely determined by output. Under this assumption, the rate of accumulation (i.e., the growth rate of the capital stock) can be decomposed as follows:

$$g_K = \frac{h}{v}u \quad (2.1)$$

where $h = I/Y$ denotes the propensity to invest, $v = K/Y^P$ the capital-to-potential-output ratio, and $u = Y/Y^P$ the rate of capacity utilization.

The change in the rate of capacity utilization can be expressed as a function of the growth rate of output, $g_Y = \dot{Y}/Y$, and the accumulation rate g_K derived above:

$$\dot{u} = u(g_Y - g_K) \quad (2.2)$$

The second crucial assumption of the SSM is that consumption can be decomposed into induced and autonomous components. Following traditional Keynesian reasoning, induced consumption is a function of income, determined by the marginal propensity to consume c_Y , while autonomous consumption is represented by a parameter Z , which is constant in the short run but may grow over time. Aggregate consumption is therefore given by:

$$C = Z + c_Y Y \quad (2.3)$$

Rearranging the national income identity for a closed economy without government ($Y = C + I$) yields the well-known expression for output as the product of autonomous demand and the supermultiplier:

$$Y = \frac{1}{s - h}Z \quad (2.4)$$

In addition to the decomposition of aggregate demand into induced and autonomous components, the SSM fundamentally relies on the “capital stock adjustment principle” introduced by Matthews (1959) (Freitas and Serrano 2015). This principle captures the assumption that firms target a desired normal rate of capacity utilization and adjust investment accordingly. When

²Additionally, I adopt a slightly different notation from Freitas and Serrano (2015) and Serrano and Freitas (2017b) for the sake of clarity and consistency.

actual utilization exceeds the desired level, firms accelerate investment; conversely, when it falls below that level, they reduce investment.

To incorporate this mechanism into the simplified SSM representation of investment, Freitas and Serrano (2015) endogenize the propensity to invest with respect to deviations of actual capacity utilization from its normal level:

$$\dot{h} = h\gamma_u(u - u_n) \quad (2.5)$$

With an endogenous investment propensity, output growth is no longer uniquely determined by autonomous demand growth. Instead, it is given by:

$$g_Y = g_Z + \frac{h\gamma_u(u - u_n)}{s - h} \quad (2.6)$$

Substituting equations 2.6 and 2.1 into equation 2.2 yields:

$$\dot{u} = u \left(g_Z + \frac{h\gamma_u(u - u_n)}{s - h} - \frac{h}{v}u \right) \quad (2.7)$$

We therefore obtain two dynamic equations describing the adjustment paths of the propensity to invest (equation 2.5) and the rate of capacity utilization (equation 2.7).

The fully adjusted position—that is, the long-run steady state of the model—is characterized by the equality of actual and normal capacity utilization ($u = u_n$), implying $\dot{u} = 0$. Under this condition, equation 2.5 yields $\dot{h} = 0$, and the expressions for output growth (equation 2.6) and capacity growth (obtained by rearranging equation 2.7) simplify to the well-known long-run SSM result: the growth rates of capacity, investment, output, and autonomous demand are equal:

$$g_K = g_I = g_Y = g_Z \quad (2.8)$$

The model therefore generates an equilibrium growth path in which economic expansion is “[...] led by autonomous non-capacity-creating expenditure [...]” (Serrano and Freitas 2017b, p. 76). Provided that the stability conditions are satisfied, the growth rate of autonomous demand is the only variable capable of permanently increasing output growth and accumulation. Under dynamic stability, deviations of capacity utilization from its normal level are self-correcting, ensuring convergence towards the fully adjusted position (Serrano and Freitas 2017a; Freitas and Serrano 2015).

Changes in the marginal propensity to save (s), the capital-to-potential-output ratio (v), and the normal rate of capacity utilization (u_n) generate only level effects and do not permanently affect long-run growth rates. Nevertheless, they influence the size of the supermultiplier and, consequently, alter the investment propensity required to reconcile actual capacity utilization with its desired normal level (Freitas and Serrano 2015).

2.1 Theoretical Extensions

Whereas the canonical SSM developed by Freitas and Serrano (2015) treats autonomous non-capacity-creating demand as a single aggregate variable, more elaborate versions of the model provide a more explicit representation of its constituent components. In an open economy with a government sector, autonomous non-capacity-creating demand can be decomposed into autonomous consumption, investment, public spending, and exports ($Z = C_a + I_a + G_a + X_a$) (Hein 2023b). As analytically demonstrated by Dutt (2019), the core conclusions of the Supermultiplier model remain unchanged, regardless of which expenditure category serves as the autonomous component.

Pariboni (2016), Mandarino et al. (2020), and Di Bucchianico et al. (2024) focus on credit-financed consumption as the dominant autonomous demand component. They show that Supermultiplier models driven by debt-financed consumption can generate sustainable growth regimes characterized by stable long-run debt-to-income ratios.

Deleidi et al. (2019a) and Deleidi et al. (2019b) focus on government spending and examine the interaction between public expenditure and private R&D investment. They find that expansionary fiscal policy aimed at promoting structural change (mission-oriented policy) stimulates private R&D expenditure, thereby strengthening the supermultiplier beyond its direct contribution to growth. More generally, Fiebiger (2021) likewise concludes that public spending generates crowding-in effects. Furthermore, Summa (2022) argues that expansionary fiscal policy, beyond its role in countercyclical interventions, enhances private-sector financial stability through its long-run expansionary effects. Similarly, Di Domenico and Russo (2022) show that fiscal expansion in response to labour-augmenting technological change is necessary to maintain employment.

Oreiro and Santos (2023) argue that exports constitute the only viable source of demand-led growth for small open economies. Faster growth driven by rapidly expanding alternative autonomous demand components becomes infeasible due to balance-of-payments constraints, whereas growth below the balance-of-payments-constrained rate is considered undesirable.

2.2 Theoretical and Empirical Critique

Researchers from the Kaleckian camp have criticised the Supermultiplier approach on several grounds, including its assumption of an exogenously given normal rate of capacity utilization (Nikiforos 2013; Nikiforos 2018), the empirical plausibility and practical relevance of its stability conditions (Gallo 2022), the absence of an explicit investment function that accounts for profitability considerations and animal spirits (Nikiforos 2018; Nikiforos et al. 2024b; Oreiro et al. 2020), and the empirical direction of causality between utilization and accumulation (Nikiforos et al. 2024b; Nikiforos et al. 2024a).

A detailed examination of these issues is beyond the scope of this paper. For responses to the aforementioned criticisms, I refer to Dutt (2019), Dejuán (2017), Serrano et al. (2023),

and Summa et al. (2024). Instead, I focus on perhaps the most fundamental criticism of the Supermultiplier approach: the claim that autonomous expenditure is not genuinely autonomous (Nikiforos 2018; Nikiforos et al. 2024b; Skott et al. 2022).

At the outset, it is worth noting that this debate is often characterized by semantic ambiguity. Definitions of autonomous non-capacity-creating demand vary considerably across the SSM literature. Importantly, Serrano et al. (2023) emphasize that “autonomous” was never intended to imply complete independence from other economic variables.³ According to these authors, the crucial distinction between autonomous and induced demand lies in its *financial independence* from the circular flow of income. Autonomous demand must not arise directly from contractual incomes generated by production decisions (Serrano et al. 2023, pp. 25–26), but may nevertheless depend on variables such as interest rates, competitiveness, and institutional arrangements.

Critics nevertheless identify several channels through which autonomous demand may depend on current or past income. With regard to credit-financed consumption and residential investment, Nikiforos (2018), Nikiforos et al. (2024a), and Skott et al. (2022) emphasize the importance of expected lifetime income, debt-to-income ratios, financial conditions, and growth expectations.

Although stock-flow-consistent Supermultiplier models generally yield stable long-run debt-to-income ratios, Nikiforos (2018) points out that overshooting debt ratios during the transition may trigger credit restrictions before induced investment has had sufficient time to stabilize the system. In such cases, autonomous credit-financed demand may contract in a Minskyan fashion before the stabilizing mechanisms become effective. To date, this argument has received limited attention in the SSM literature, where banks are generally treated as passive intermediaries (Pariboni 2016; Mandarino et al. 2020). Similar criticisms apply to government expenditure. Nikiforos (2018, p. 10) note that government spending is unlikely to be autonomous if fiscal policy responds to deficits or tax revenues, while Skott et al. (2022) find little empirical evidence that government spending grows independently of national income.

At a minimum, as argued by Dutt (2019), treating autonomous demand components as exogenous requires stronger theoretical and empirical justification. While the induced nature of investment is explicitly justified by the capital stock adjustment principle, comparable justifications for the exogenous growth of autonomous demand are largely absent from the canonical literature (Serrano 1995; Serrano and Freitas 2017b; Freitas and Serrano 2015).

The distinction between autonomy and exogeneity is therefore crucial. Autonomous demand components may indeed be autonomous in the sense that they are not financed through contractual income. However, this does not necessarily imply that they are independent of domestic

³Already Serrano (1995, p. 84) argued that “the evolution over time of such autonomous components necessarily depends on a variety of economic, institutional and technological forces”, while expressing doubts about the possibility of representing them in a general functional form.

income, income distribution, or financial conditions. Consequently, it may be more fruitful to bridge the gap between autonomy and exogeneity by conceptualizing the components of Z as *autonomous yet endogenous* demand components. This perspective is adopted in the next section, which systematically examines potential channels of endogeneity for all components of autonomous demand.

3 Endogenous Autonomous Demand in the Supermultiplier Model

The idea of endogenous autonomous demand has given rise to a growing body of literature that seeks to incorporate feedback effects from income and functional income distribution into the SSM framework (Brochier 2020; Avritzer and Brochier 2025; Brochier and Macedo e Silva 2019; Fiebiger 2024). At the same time, it has prompted a refinement of the definition of autonomous demand by the original proponents of the SSM approach. In their response to critics, Summa et al. (2024) argue with respect to residential investment as a component of autonomous demand that “even if income or output had some impact, as long as this is not the single determinant of this type of expenditure, residential investment will still be partially independent from the cycle.” A similar argument is advanced by Serrano et al. (2023), who contend that a partial endogeneity of autonomous demand with respect to income can be readily incorporated into the Supermultiplier model, provided that some component of autonomous demand remains truly independent. Under such conditions, the general results of the model remain unchanged. Formally, this partial endogenization can be represented as

$$Z = \bar{Z} + \rho Y \quad (3.1)$$

where $\bar{Z}$ denotes the truly autonomous component of demand, while ρY captures the feedback effect from income on autonomous demand. Substituting equation 3.1 into the canonical Supermultiplier model introduced in Section 2, the equilibrium level of output becomes

$$Y^* = \frac{1}{s - h - \rho} \bar{Z} \quad (3.2)$$

Hence, the partial endogenization of autonomous demand reduces the size of the supermultiplier, while the long-run growth rate of output and the normal rate of capacity utilization continue to be determined exclusively by the growth rate of the truly autonomous component of demand, $g_{\bar{Z}}$. As equation 3.2 clearly illustrates, the long-run growth rate remains independent of income distribution in this formulation.

An important implication of these recent contributions for attempts to establish the paradoxes of thrift and cost in the long run is that demonstrating only a partial endogeneity of autonomous demand is insufficient. Instead, it must be shown that the *growth rate* of autonomous demand depends systematically on income and distribution.

Establishing an endogeneity of autonomous demand with respect to functional income distribution requires, first and foremost, a detailed analysis of the transmission channels through which distribution affects both the level and growth rate of autonomous demand. Accordingly, the present section systematically examines the relationship between the individual components of autonomous demand, functional income distribution, and the propensity to save.

3.1 Consumption out of wealth

Brochier and Macedo e Silva (2019) argue that the absence of the paradoxes of thrift and cost in the canonical Supermultiplier model stems from the neglect of feedback effects running from flows to stocks. To address this problem, they develop a stock-flow consistent Supermultiplier model (SFC-SSM) in which consumption consists of both an induced and an autonomous component, with the latter depending on accumulated household wealth V_{-1} (see also Fiebiger (2024)).⁴

$$C = c_Y(1 - \pi)Y + c_V V_{-1} \quad (3.3)$$

The stock of wealth in a given period is determined by the stock of wealth inherited from the previous period and current saving:

$$V = V_{-1} + S \quad (3.4)$$

However, a fundamental accounting problem arises when wealth-financed consumption is treated as the only (or dominant) autonomous component of demand in a stock-flow consistent Supermultiplier model. Given a stable propensity to consume out of wealth ($\dot{c}_V = 0$), the growth rate of wealth-financed consumption is equal to the growth rate of household wealth itself. Consequently, a persistently positive growth rate of wealth-financed consumption requires a continuously growing stock of household wealth.

Yet household wealth can only increase if household saving exceeds consumption out of wealth. In macroeconomic terms, this implies a net monetary leakage from aggregate demand. In a closed economy with fully induced investment and no other sector generating net expenditure injections, such leakages reduce aggregate demand growth and ultimately drive the system toward a zero growth rate.

Therefore, wealth-financed consumption cannot by itself serve as a sustainable autonomous driver of growth. For wealth-financed consumption to generate persistent expansion through the Supermultiplier mechanism, another sector must simultaneously accumulate net liabilities in order to accommodate households' desire to accumulate wealth. Alternatively, household wealth would have to increase through mechanisms such as capital gains or asset revaluations that are independent of current income and saving flows.

⁴The presentation of the model by Brochier and Macedo e Silva (2019) used here abstracts from asset revaluations and the government sector, which is treated as fully endogenous in their original framework.

3.2 Credit-financed Consumption

From an SFC perspective, it appears intuitive that credit-financed consumption is endogenous to income and distribution. If households are unwilling to sustain ever-increasing debt-to-income ratios, debt-financed consumption must ultimately be linked to the level and growth of income and can therefore never be fully autonomous. As shown by Pariboni (2016) and Mandarino et al. (2020), the stabilization of debt-to-income ratios may occur endogenously through rising incomes. Nevertheless, individual households will always consider the future repayment burden of debt and will therefore condition borrowing decisions, in one way or another, on current and expected income. This endogeneity channel is particularly evident in the case of credit-card debt or debt arising from the use of Fintech applications such as PayPal, where repayment typically occurs on a monthly basis.

Accordingly, many studies outside the SSM research agenda treat credit-financed consumption as a derived function of disposable income, where the level of borrowing is determined by a propensity to borrow (see, for example, Dutt (2006) or Hein (2012)). Such an endogenization would imply that credit-financed consumption becomes fully induced, despite remaining financially autonomous, and therefore ceases to function as an autonomous demand component in the SSM sense. In that case, the growth rate of credit-financed consumption would be entirely determined by the growth rate of output.

Avritzer and Brochier (2025) adopt a different endogenization strategy by partially linking the growth rate of credit-financed consumption to workers' debt-to-income ratio and the interest rate on consumer credit. The problem is that Avritzer and Brochier (2025) provide neither theoretical nor empirical justification for this specific form of endogeneity. Introducing a link between debt-to-income ratios and credit-financed consumption is certainly plausible as argued above. However, it remains unclear why workers' debt-to-income ratio should directly affect the *growth rate* of credit-financed consumption rather than its *level*. While the chosen functional form is analytically convenient for deriving the paradox of costs in the long run, it lacks a convincing economic foundation.

Endogenizing the *level* of credit-financed consumption with respect to workers' debt-to-income ratios would appear more intuitive, since workers can directly influence their borrowing decisions but not the growth rate of borrowing itself. However, as Van Treeck (2014) shows for the US, prior to 2008 debt-to-income ratios increased for all but the top 10% of the income distribution without slowing consumer credit growth. On the contrary, both debt-financed consumption and debt-to-income ratios increased simultaneously. So there must be at least more factors at work in determining the trajectory of consumer credit. This motivates the present study to draw on a broader range of theoretical and empirical literature in order to endogenize credit-financed consumption with respect to income and distribution.

According to heterodox consumption theories inspired by Duesenberry's relative income hypothesis and Veblen's notion of conspicuous consumption, individual consumption is shaped by

consumption norms, defined as “the standard of consumption an individual considers normal based on his group identity” (Cynamon and Fazzari 2008). Consumption norms are determined by both cross-sectional and autoregressive reference mechanisms. In terms of cross-sectional reference effects, individuals are influenced by social reference groups through status comparison and information transmission (Cynamon and Fazzari 2008). Status comparison implies that consumption generates positional externalities, since the value of certain goods depends on their prevalence within the relevant reference group (Frank et al. 2014). As a result, individual consumption demand is positively affected by the consumption behavior of the reference group, which in turn feeds back into the group’s own consumption behavior, generating a type of consumer arms race (Frank et al. 2014).

Numerous studies suggest that individuals tend to select reference groups located above them in the income hierarchy. Consequently, redistribution from lower- to higher-income households, or advertising targeted at above-median income earners, can generate “expenditure cascades,” in which higher consumption levels trickle down from rich to poor households through consumption emulation (Frank et al. 2014).

The autoregressive dimension of consumption norms refers to the persistence of consumption habits and the desire to maintain previously attained living standards. Past increases in consumer credit, whether driven by greater demand or more permissive credit supply, increase future demand for consumer credit (Brown 2008; Cynamon and Fazzari 2008; Ryoo and Kim 2014; Starr 2010; Gao et al. 2023). A related transmission mechanism is the “Diderot Effect” discussed by Gonzalez (2015). According to this effect, the acquisition of a new good alters the standards against which existing possessions are evaluated. As a consequence, the purchase of expensive goods through credit may create demand for additional credit-financed consumption (Gonzalez 2015; Starr 2010; Russo et al. 2016).

This path dependence of consumption amplifies the positive relationship between inequality and debt-financed consumption among lower-income households. If income is redistributed from lower- to higher-income groups, high-income households may increase consumption, while lower-income households may attempt to preserve previously attained living standards rather than reducing consumption proportionally. As their income declines, an increasing share of their consumption expenditure must therefore be financed through credit.

Whether the conceptual distinction between capitalists and workers can be meaningfully applied to theories of relative consumption remains disputed. Such an approach requires workers to regard capitalists as their primary reference group. This view has been advanced by Dutt (2008), Barba and Pivetti (2008), and Setterfield and Kim (2016). Other authors argue instead that individuals select reference groups closer to their own social identity. Nevertheless, Kapeller and Schütz (2015) demonstrate in a neo-Kaleckian model with a heterogeneous working class that the effects of conspicuous consumption persist even under these assumptions.

The central conclusion of the literature on conspicuous consumption and the relative income

hypothesis is that rising inequality, through redistribution from lower- to higher-income groups, may increase credit-financed consumption among lower-income households (Van Treeck 2014; Kapeller and Schütz 2015; Setterfield and Kim 2016). Propensities to consume and to borrow therefore depend not only on the absolute level of household income, but also on a household's relative position within the income distribution and on the relationship between current and past income (Van Treeck 2014). Empirical evidence from the United States, including rising household indebtedness and consumption alongside a falling wage share, as well as increases in perceived minimum consumption that exceed the growth of median income, provides strong support for theories of conspicuous consumption and the relative income hypothesis (Van Treeck 2014; Kapeller and Schütz 2015).

3.3 Residential Investment

The literature on the macroeconomic determinants of residential investment remains relatively limited and does not provide a clear academic consensus. Nevertheless, house prices and interest rates are commonly identified as key determinants of residential investment (Petrini and Teixeira 2023; Kohlscheen et al. 2020). Petrini and Teixeira (2023) combine these variables into a measure they term the “housing own rate of return” and find that changes in this indicator explain roughly half of the variation in residential investment growth. Teixeira and Petrini (2023) develop a stock-flow consistent Supermultiplier model (SFC-SSM) to analyse the long-run growth effects of residential investment. In their framework, residential investment acts as a component of autonomous demand and is specified as follows:

$$I_h = (1 + g_{I_h})I_{h-1} \quad (3.5)$$

The growth rate of residential investment is assumed to be

$$g_{I_h} = \phi_0 - \phi_{\text{own}} \left(\frac{1 + r_{mo}}{1 + g_{p_h}} - 1 \right) \quad (3.6)$$

where r_{mo} denotes the mortgage interest rate and g_{p_h} the growth rate of real estate prices, i.e. house price inflation.⁵ Using this specification, Petrini and Teixeira (2023) derive the standard Supermultiplier result that functional income distribution has no long-run effect on growth, whereas asset price inflation and interest rates do affect long-run growth through equation 3.6.

In contrast, Arestis and González-Martínez (2015) and Egebo and Lienert (1988) identify household disposable income as a major determinant of residential investment across most OECD economies, with the notable exception of the United States. With respect to the direct impact of income distribution and inequality on residential investment, the existing literature is sparse and reaches conflicting conclusions.

Guan (2017) argues that rising income inequality reduces consumption and increases aggregate saving because higher-income households exhibit larger propensities to save. Given lower

⁵The original notation has been modified for consistency.

consumption demand and higher saving, investors are assumed to shift resources toward the “virtual economy” — speculative assets driven primarily by capital gains — rather than the “real economy,” where returns depend on productive activity. Within this speculative sphere, real estate is argued to be particularly attractive because of its specific asset characteristics. As capital flows into the real estate sector, rising property prices stimulate further investment, generating a self-reinforcing dynamic of residential investment and asset price inflation. Goda et al. (2019) similarly emphasise the role of real estate as an investment asset and argue that rising incomes at the top of the distribution increase investment in real estate, thereby pushing up house prices and further stimulating real estate investment (see also Nakajima (2005); Zhang (2016)).

Hailemariam et al. (2021) criticise the analysis of Goda et al. (2019), arguing that their empirical findings are unreliable because they focus on a limited time period during which inequality and house prices happened to move together. Instead, Hailemariam et al. (2021) analyse data for 17 OECD countries over the period 1870–2015 and find a negative relationship between inequality and house prices. In their framework, crime rates constitute the main transmission channel: higher inequality increases crime, which depresses housing prices in affected areas more strongly than prices rise elsewhere. Määttänen and Terviö (2014) arrive at a similar conclusion using an assignment model.

Given the ambiguous findings in the literature discussed above, no clear conclusion can be drawn regarding the qualitative or quantitative impact of functional income distribution on residential investment or the growth rate of it.

3.4 Government Expenditures

Most studies applying the SSM approach treat all government expenditure as autonomous demand. This is, however, conceptually problematic. Proponents of this view argue that public spending is autonomous because it results from exogenous political decisions and is initially financed through central bank money creation before taxes are collected (Di Domenico et al. 2024). While fiscal capacity in a sovereign monetary system is indeed not constrained by prior tax revenue — as emphasized by Modern Monetary Theory and widely accepted in post-Keynesian economics (Lavoie 2022) — governments in practice strongly base expenditure planning on expected tax revenues and adjust spending accordingly Nikiforos (2018).⁶

From an accounting perspective, the fiscal position also matters. Although government spending initially creates reserves and deposits, subsequent taxation withdraws money from the circuit. Over a full period, a balanced budget therefore implies a zero net injection. This becomes clear analytically when government spending is assumed to be entirely ‘tax-financed’:

$$Y = C + I + G + Z = (1 - s)(1 - t)Y + hY + tY + Z \quad (3.7)$$

⁶For Germany, see for example BMF (2026).

Solving for Y yields

$$Y = \frac{Z}{(s - ts - h)} \quad (3.8)$$

Equation 3.8 shows that, under a balanced budget, government spending affects the supermultiplier but does not appear as an autonomous demand component in the numerator. A larger government share in GDP still raises short-run equilibrium output because taxed income is assumed to be fully spent, whereas untaxed income is partly saved. However, since changes in the tax rate t do not directly affect autonomous demand, the long-run growth rate remains independent of government size.

It is therefore more appropriate to distinguish between an induced component of government expenditure linked to expected tax revenues and a genuinely autonomous, deficit-financed component (With regard to Germany, one could think of the recent "off-budget funds" or deliberate suspensions of the debt-break). What matters for the dynamics of autonomous demand is not total government spending, but specifically this debt-financed part.

The literature on the political economy determinants of government spending identifies both demand- and supply-side determinants, but empirical findings remain mixed and highly context-specific (Facchini 2018). Demand-side theories emphasize factors such as per capita income, inequality, and political ideology. Wagner's Law links higher income to greater public spending, though empirical support is weak. Median voter models predict more redistribution in unequal societies, yet evidence is inconclusive here as well (Meltzer and Richard 1981; De Mello and Tiongson 2006). Political ideology and fragmentation, however, appear to exert a more robust influence on spending patterns (Facchini 2018). Supply-side theories stress productivity differentials and labor costs. Building on Baumol's cost disease, Facchini et al. (2017) argue that rising labor costs increase government expenditure relative to GDP, implying an inverse relationship between the profit share and public spending.

Research on countercyclical fiscal policy further suggests that fiscal policy reacts strongly to declines in lower wages, mainly through automatic stabilizers such as taxes and unemployment benefits (Murray 2024). This implies that redistribution from wages to profits may reduce tax revenues while leaving expenditure stable or even increasing it, thereby expanding deficit-financed spending. Yet while this mechanism likely applies to cyclical downturns, structural declines in wages could instead intensify pressures for austerity and budget cuts.

Marxian and Kaleckian approaches emphasize class power and political conflict. Kalecki (1943) argues that capitalists oppose sustained full employment because it weakens labor discipline, making austerity a political tool to preserve capitalist power. Related work highlights the influence of lobbying, political finance, bureaucratic structures, and international organizations in shaping fiscal policy in favor of capital interests (Ferguson et al. 2020; Farnsworth 2005). At the same time, some forms of public spending, such as military, education, and parts of social policy, may also serve capitalist interests (Foley 1978). Empirical evidence further suggests that

the determinants of government spending vary across historical periods. Brady and Lee (2014) find that class-related power resources mattered during periods of fiscal expansion, whereas institutional and structural factors dominated during retrenchment periods.

Overall, the relationship between functional income distribution and government spending remains theoretically ambiguous. A higher profit share may increase government spending through redistributive pressures, political polarization, and countercyclical stabilization, but it may also reduce spending through austerity pressures, weaker labor power, and Baumol-type cost dynamics. Furthermore, attributing these effects to induced and autonomous government spending is not straightforward.

3.5 Exports

The link between the *level* of exports and functional income distribution is already implicit in Michal Kalecki's theory of cost-plus pricing and has been incorporated into Kaleckian open-economy models by various authors. Detailed textbook treatments are provided by Hein (2023a, Ch. 4) and Hein (2014, Ch. 7).

According to Kaleckian pricing theory, firms operating under oligopolistic competition determine prices by applying a mark-up over unit variable costs. Unit variable costs consist of unit labor costs (ULC) and unit material costs (UMC). In an open economy, firms import raw materials and intermediate inputs for production as well as finished goods for domestic sale. Mark-up pricing can therefore be represented as

$$p = (1 + m)(ULC + UMC) = (1 + m) \left(\frac{w}{y} + p_f e \iota \right) \quad (3.9)$$

where m is the mark-up, $w = W/N$ the wage rate, $y = Y/N$ labor productivity, p_f the foreign price level, e the nominal exchange rate (in price notation), and ι the import intensity of production.

Defining the ratio of unit material costs to unit labor costs as

$$j = \frac{UMC}{ULC} = \frac{p_f e \iota}{w/y}, \quad (3.10)$$

equation 3.9 can be rewritten as

$$p = (1 + m)(1 + j) \frac{w}{y}. \quad (3.11)$$

The profit share is therefore given by

$$\pi = \frac{\Pi}{Y} = \frac{\Pi}{\Pi + W} = \frac{m(1 + j)}{m(1 + j) + 1}. \quad (3.12)$$

Hence, in an open economy the profit share depends not only on the mark-up, but also on foreign prices, the nominal exchange rate, the import intensity of output, and domestic unit

labor costs.

Following Hein (2014, Ch. 7), the real exchange rate $e_r = ep_f/p$ is used as a proxy for international price competitiveness. A higher real exchange rate corresponds to greater international competitiveness. Exports depend on foreign demand and international price competitiveness:

$$X = x_1 e_r + x_2 Y_f \quad (3.13)$$

The growth rate of exports is obtained from equation 3.13 as

$$g_X = \frac{x_1 e_r}{X} g_{e_r} + \frac{x_2 Y_f}{X} g_{Y_f}, \quad (3.14)$$

where g_{e_r} is the growth rate of the real exchange rate and g_{Y_f} the growth rate of foreign income.

For the analysis of the impact of the propensity to consume and the profit share on long-run export growth, it must be taken into account that the real exchange rate is itself linked to distribution through equations 3.9–3.12. Substituting equation 3.9 into the definition of the real exchange rate gives

$$e_r = \frac{ep_f}{(1+m) \left(\frac{w}{y} + p_f e_l \right)}. \quad (3.15)$$

Hence, the effect of the profit share on the growth rate of exports depends crucially on the source of the change in the profit share, as gets clear when taking the partial derivative of the growth rate of exports with respect to the profit share:

$$\frac{\partial g_X}{\partial \pi} = \frac{x_1 x_2 Y_f}{(x_1 e_r + x_2 Y_f)^2} (g_{e_r} - g_{Y_f}) \frac{\partial e_r}{\partial \pi}. \quad (3.16)$$

The corresponding sign condition for the effect of the profit share on the growth rate of exports is

$$\frac{\partial g_X^*}{\partial \pi} \geq 0 \iff (g_{e_r} - g_{Y_f}) \frac{\partial e_r}{\partial \pi} \geq 0. \quad (3.17)$$

Thus, a positive effect of the profit share on export growth occurs either when the real exchange rate grows faster than foreign income and the effect of the profit share on competitiveness is positive, or when foreign income grows faster than the real exchange rate and the effect of the profit share on competitiveness is negative.

With respect to the determinants of distribution discussed above, the relevant partial derivatives of the real exchange rate are

$$\frac{\partial e_r}{\partial m} = -\frac{ep_f}{(1+m)^2 \left(\frac{w}{y} + p_f e_l\right)} < 0, \quad (3.18)$$

$$\frac{\partial e_r}{\partial w} = -\frac{ep_f}{(1+m)y \left(\frac{w}{y} + p_f e_l\right)^2} < 0, \quad (3.19)$$

$$\frac{\partial e_r}{\partial p_f} = \frac{e\frac{w}{y}}{(1+m) \left(\frac{w}{y} + p_f e_l\right)^2} > 0, \quad (3.20)$$

$$\frac{\partial e_r}{\partial e} = \frac{p_f \frac{w}{y}}{(1+m) \left(\frac{w}{y} + p_f e_l\right)^2} > 0, \quad (3.21)$$

$$\frac{\partial e_r}{\partial \iota} = -\frac{ep_f^2 e}{(1+m) \left(\frac{w}{y} + p_f e_l\right)^2} < 0. \quad (3.22)$$

As equations 3.18–3.22 show, international price competitiveness increases when a higher profit share is driven by falling domestic wages, rising foreign prices, or a nominal depreciation of the domestic currency. By contrast, competitiveness deteriorates when a higher profit share results from a rising mark-up or increasing import intensity.

Table 1 summarizes the overall effects of distributional changes on long-run export growth.

Table 1: Export Growth Regimes

Cause	$\Delta\pi$	Δe_r	Export growth
$+\Delta m$	+	–	$-\Delta g_{X_a}$ if $g_{e_r} > g_{Y_f}$; $+\Delta g_{X_a}$ if $g_{e_r} < g_{Y_f}$
$-\Delta w$	+	+	$+\Delta g_{X_a}$ if $g_{e_r} > g_{Y_f}$; $-\Delta g_{X_a}$ if $g_{e_r} < g_{Y_f}$
$+\Delta p_f$	+	+	$+\Delta g_{X_a}$ if $g_{e_r} > g_{Y_f}$; $-\Delta g_{X_a}$ if $g_{e_r} < g_{Y_f}$
$+\Delta e$	+	+	$+\Delta g_{X_a}$ if $g_{e_r} > g_{Y_f}$; $-\Delta g_{X_a}$ if $g_{e_r} < g_{Y_f}$
$+\Delta \iota$	+	–	$-\Delta g_{X_a}$ if $g_{e_r} > g_{Y_f}$; $+\Delta g_{X_a}$ if $g_{e_r} < g_{Y_f}$

4 Simulations

In addition to the analytical investigation of the various channels through which autonomous demand may become endogenous, the macroeconomic implications of endogenous autonomous demand will now be explored through simulations using a simple stock-flow-consistent Super-multiplier model (SFC-SSM). The links between functional income distribution and autonomous demand discussed above will be operationalized and subsequently simulated in the SFC-SSM only where they could be reliably established through the literature review in Section 3 (i.e., for

consumption out of wealth, credit-financed consumption, and exports), while the ambiguous cases will not be examined further.

The balance-sheet and transaction-flow matrices presented below define the general accounting structure of the baseline model, which will subsequently be modified for each of the specific components of endogenous autonomous demand under consideration.

In its baseline specification, the model consists of five sectors: workers' households, capitalist households, firms, the government sector, and banks. For the sake of simplicity, the model abstracts from the existence of a central bank and assumes a purely endogenous bank-money economy. Furthermore, bank deposits constitute the only financial asset, while firms are the only sector permitted to incur debt. Table 2 presents the complete balance-sheet matrix of the baseline model.

Table 2: Balance-Sheet Matrix (Baseline SFC-SSM)

	Workers	Capitalists	Firms	Government	Banks	Total
Capital			$+K$			$+K$
Deposits	$+D_W$	$+D_C$			$-D$	0
Loans			$-L_F$		$+L$	0
Balance	$-V_W$	$-V_C$	$-V_F$	$-V_G$	$-V_B$	$-K$
Sum	0	0	0	0	0	0

The transactions taking place in each period are summarized in the transaction-flow matrix shown in Table 3. The model contains three induced components of aggregate demand: workers' and capitalists' consumption out of income (C_{YW} and C_{YC}), firms' capacity-creating investment (I), and induced government expenditure (G_T). Workers receive wage income W and pay taxes on labor income T_W , while all profits Π are distributed to capitalists, who in turn pay taxes on capital income T_C . Functional income distribution is governed by the profit share π , such that $W = (1 - \pi)Y$ and $\Pi = \pi Y$. Tax revenues depend on income and the corresponding tax rates on labor and capital income, t_W and t_C .

The baseline model assumes a balanced government budget, implying that government expenditure is entirely induced and given by $G_T = tY$. Workers and capitalists accumulate wealth in the form of bank deposits, while firms finance capacity-creating investment through bank loans.

Table 3: Transaction Flow Matrix (Baseline SFC-SSM)

	Workers	Capitalists	Firms		Government	Banks	Total
			Current	Capital			
Transactions							
<i>Autonomous Demand (Z)</i>			+Z			[-Z]	
Consumption (income)	$-C_{YW}$	$-C_{YC}$	$+C_Y$				0
Investment			$+I$	$-I$			0
Government spending			$+G_T$		$-G_T$		0
[Memo: GDP]			[Y]				
Taxes	$-T_W$	$-T_C$			$+T$		0
Wages	$+W$		$-W$				0
Firms profits		$+\Pi$	$-\Pi$				0
Net lending	NL_W	NL_C		NL_F	NL_G	NL_B	0
Flow of Funds							
Δ in loans				$+\Delta L_F$		$-\Delta L$	0
Δ in deposits	$-\Delta D_W$	$-\Delta D_C$				$+\Delta D$	0
Total	0	0	0	0	0	0	0

The closure of the SFC-SSM model closely resembles the canonical Supermultiplier model discussed in Section 2. Investment is fully induced, such that $I = hY$, where the propensity to invest h follows a flexible accelerator mechanism reacting to deviations of capacity utilization from its normal rate:

$$\dot{h} = h\gamma_u(u - u_n) \quad (4.1)$$

Consumption out of income is modeled as a fixed share of disposable income. Workers' consumption is given by

$$C_{YW} = c_{YW}(1 - t_W)(1 - \pi)Y \quad (4.2)$$

while capitalists' consumption is given by

$$C_{YC} = c_{YC}(1 - t_C)\pi Y \quad (4.3)$$

For simplicity, the capital-to-potential-output ratio is normalized to unity, implying that the rate of capacity utilization reduces to

$$u = \frac{Y}{K} \quad (4.4)$$

Autonomous demand Z constitutes the driving force of the system. In the transaction-flow matrix shown in Table 3, autonomous demand is not explicitly assigned to a specific sector. In the baseline simulation presented below, autonomous demand is assumed to be financed through deposit creation by the banking sector, which implies that banks gradually accumulate negative net worth over time. While clearly unrealistic as a long-run institutional arrangement, this simplifying assumption facilitates the analysis of the dynamics generated by an SFC-SSM

driven by exogenous autonomous demand. In the remainder of this section, each component of autonomous demand will be introduced separately into the model, resulting in corresponding more realistic modifications to the balance-sheet and transaction-flow matrices.

In order to examine whether the paradoxes of thrift and cost emerge in the short and long run, each variant of the simple SFC-SSM is initialized in its long-run equilibrium and subsequently subjected to two separate shocks. The first shock permanently increases the profit share by 20% (profit-share shock), while the second shock permanently reduces the propensities to consume of both workers and capitalists by 20% (thrift shock). The resulting dynamics for the baseline SFC-SSM with a single exogenously growing component of autonomous demand are shown in Figure 1.

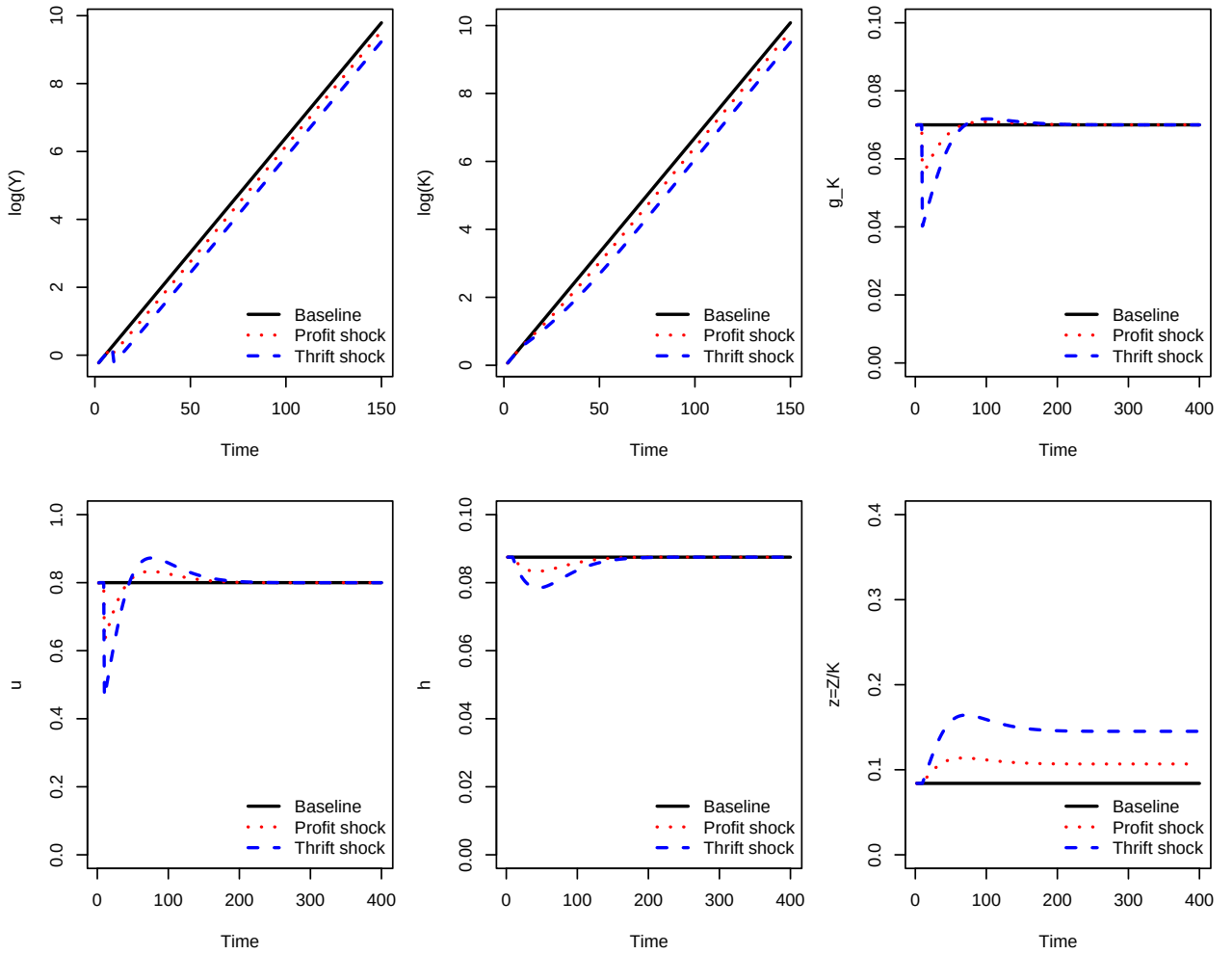


Figure 1: Baseline SFC-SSM with Exogenous Autonomous Demand

The simulation results correspond closely to the predictions of standard Supermultiplier theory. Both shocks shift the growth paths of output and the capital stock downward (upper-left and upper-middle panels⁷), while the long-run accumulation rate gradually converges back to the exogenous growth rate of autonomous demand following the initial negative disturbance (upper-right panel). The rate of capacity utilization initially declines but subsequently converges

⁷Note that the time window in these two plots is reduced to the first 150 periods for better visibility.

back to its normal level u_n through the adjustment of the propensity to invest in response to deviations from normal utilization (lower-left and lower-middle panels). Since the increase in the profit share and the reduction in the propensities to consume both raise the aggregate propensity to save, the value of the supermultiplier declines permanently. This adjustment is accommodated by a permanently higher ratio of autonomous demand to capital.

4.1 SFC-SSM with Consumption out of Wealth

As in the analysis of consumption out of wealth as the dominant component of autonomous demand in Section 3, the baseline SFC-SSM will now be extended to incorporate workers' and capitalists' consumption out of wealth ($C_{VW,t}$ and $C_{VC,t}$) and wealth accumulation ($V_{W,t}$ and $V_{C,t}$) as follows:

$$C_{VW,t} = c_{VW}V_{W,t-1} \quad (4.5)$$

$$C_{VC,t} = c_{VC}V_{C,t-1} \quad (4.6)$$

$$V_{W,t} = V_{W,t-1} + NL_{W,t} \quad (4.7)$$

$$V_{C,t} = V_{C,t-1} + NL_{C,t} \quad (4.8)$$

The balance sheet matrix of the extended SFC-SSM with consumption out of wealth is the same as for the baseline model. In the transaction flow matrix, consumption out of wealth is now added explicitly as autonomous demand, while exogenous autonomous demand that was driving the baseline model is entirely removed.

Table 4: Transaction Flow Matrix (Wealth-driven SFC-SSM)

	Workers	Capitalists	Firms Current	Capital	Government	Banks	Total
Transactions							
<i>Autonomous Demand (Z)</i>							
Consumption (wealth)	$-C_{VW}$	$-C_{VC}$	$+C_V$				0
Consumption (income)	$-C_{YW}$	$-C_{YC}$	$+C_Y$				0
Investment			$+I$	$-I$			0
Government spending			$+G_T$		$-G_T$		0
[Memo: GDP]			Y				
Taxes	$-T_W$	$-T_C$			$+T$		0
Wages	$+W$		$-W$				0
Firms profits		$+\Pi$	$-\Pi$				0
Net lending	NL_W	NL_C		NL_F	NL_G	NL_B	0
Flow of Funds							
Δ in loans				$+\Delta L_F$		$-\Delta L$	0
Δ in deposits	$-\Delta D_W$	$-\Delta D_C$				$+\Delta D$	0
Total	0	0	0	0	0	0	0

Unlike the other simulations, this version of the SFC-SSM is not initialized at its long-run steady state in order to illustrate the convergence process toward zero growth. The model is instead initialized with an above-equilibrium wealth-to-capital ratio. Since autonomous demand is generated by consumption out of wealth, the initially high stock of wealth implies a high initial level of autonomous expenditure. The simulation results of the simple SFC-SSM with endogenous consumption out of wealth are shown in Figure 2.

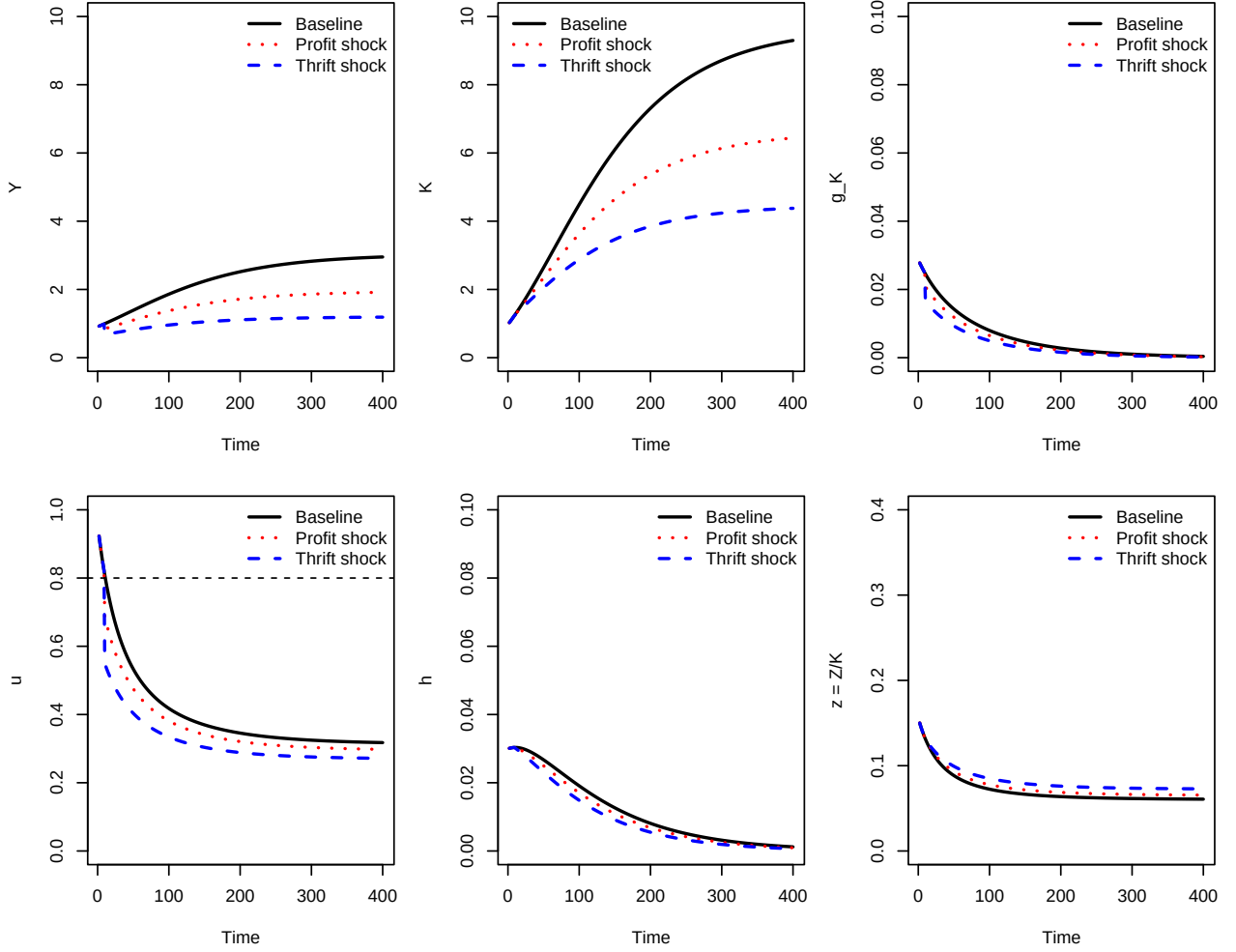


Figure 2: SFC-SSM with Endogenous Consumption out of Wealth

The upper panels show that output and the capital stock continue to grow for a prolonged period, while their growth rates gradually converge toward zero⁸. Initially, the large inherited stock of wealth generates a high level of autonomous consumption demand. This sustains a relatively high level of output and induces firms to invest according to the investment function $I = hY$. Investment expenditure then creates additional income, which raises household saving and allows the stock of wealth to continue increasing over time. Although households save more than they spend through consumption out of wealth, this does not reduce aggregate demand because the remaining saving is absorbed by firms' investment expenditure. In equilibrium,

⁸Note that output and the capital stock are here reported in levels instead of long-terms to better visualize the convergence to zero growth

household saving is matched by investment plus autonomous consumption out of wealth,

$$S = I + C_V.$$

As long as household saving exceeds consumption out of wealth, net wealth continues to increase. Since autonomous demand is proportional to the stock of wealth, the rising wealth stock sustains further autonomous consumption demand, producing a cumulative expansionary process in which autonomous demand and induced investment reinforce one another.

However, this growth mechanism weakens over time. Investment continuously increases the capital stock, while autonomous demand grows only through the comparatively slower accumulation of household wealth. Consequently, the ratio of autonomous demand to capital gradually declines, reducing the rate of capacity utilization. Once utilization falls towards its normal level, the Harrodian adjustment mechanism ($\dot{h} = h\gamma_u(u - u_n)$) lowers the propensity to invest, slowing investment growth and therefore the growth of output and wealth. The economy therefore gradually becomes overcapitalized relative to the autonomous component of demand. Eventually, the growth of autonomous demand becomes too weak to sustain continued expansion of output and capital. The system then converges toward a stationary position in which net wealth ceases to grow, autonomous demand stops expanding, normal capacity utilization cannot be recovered and the growth rates of output and capital converge toward zero.

The contractionary shocks to the profit share and to the propensities to consume out of income do not alter the long-run tendency of the model to converge toward zero growth but they accelerate the convergence towards the new long-run steady state.

4.2 SFC-SSM with Credit-financed Consumption

Based on the discussion in section 3, credit-financed consumption is operationalized with the following function:

$$C_L = \dot{L} = \zeta_0 + \zeta_1 C_{L-1} + \zeta_2 \pi - \zeta_3 \frac{L_{-1}}{(1 - \pi)Y} \quad (4.9)$$

In equation 4.9, ζ_1 captures the self-reinforcing dynamics of consumer borrowing arising from positional externalities, consumer arms races, and the “Diderot effect.” The parameter ζ_2 reflects the positive effect of inequality on credit-financed consumption operating through expenditure cascades, conspicuous and defensive consumption, and the desire to preserve previously attained living standards. The final term captures both potential credit rationing resulting from rising debt-to-income ratios and households’ attempts to avoid unsustainable debt accumulation. Finally, the parameter ζ_0 accounts for determinants of aggregate credit-financed consumption that are not directly related to income distribution, including, for example, consumer sentiment, demographic structure, financial innovation, and the degree of financial regulation.

The balance sheet matrix is now adjusted to allow for debt accumulation of workers. For

simplicity it is assumed that only workers engage in credit-financed consumption.

Table 5: Balance-Sheet Matrix (Credit-driven SFC-SSM)

	Workers	Capitalists	Firms	Government	Banks	Total
Capital			$+K$			$+K$
Deposits	$+D_W$	$+D_C$			$-D$	0
Loans	$-L_W$		$-L_F$		$+L$	0
Balance	$-V_W$	$-V_C$	$-V_F$	$-V_G$	$-V_B$	$-K$
Sum	0	0	0	0	0	0

Likewise, the transaction flow matrix is adjusted to show workers' credit-financed consumption and the corresponding increase in workers loans.

Table 6: Transaction Flow Matrix (Credit-driven SFC-SSM)

	Workers	Capitalists	Firms		Government	Banks	Total
			Current	Capital			
Transactions							
Autonomous Demand (Z)							
Consumption (credit)	$-C_{LW}$		$+C_L$				0
Consumption (income)	$-C_{YW}$	$-C_{YC}$	$+C_Y$				0
Investment			$+I$	$-I$			0
Government spending			$+G_T$		$-G_T$		0
[Memo: GDP]			Y				
Taxes	$-T_W$	$-T_C$			$+T$		0
Wages	$+W$		$-W$				0
Firms profits		$+\Pi$	$-\Pi$				0
Net lending	NL_W	NL_C		NL_F	NL_G	NL_B	0
Flow of Funds							
Δ in loans	$+\Delta L_W$			$+\Delta L_F$		$-\Delta L$	0
Δ in deposits	$-\Delta D_W$	$-\Delta D_C$				$+\Delta D$	0
Total	0	0	0	0	0	0	0

This version of the model is initialized at its long-run equilibrium before being subjected to both the profit shock and the thrift shock.

The simulation results of the simple SFC-SSM with endogenous credit-financed consumption are shown in figure 3⁹. The dynamics of g_Z indicate that the extended model is not identical to the version with exogenous autonomous demand. In particular, the profit shock initially increases the growth rate of credit-financed consumption and the effect of the profit shock on utilization

⁹In the lower panels, the time horizon was shortened in order to display the dynamics around the shock more clearly.

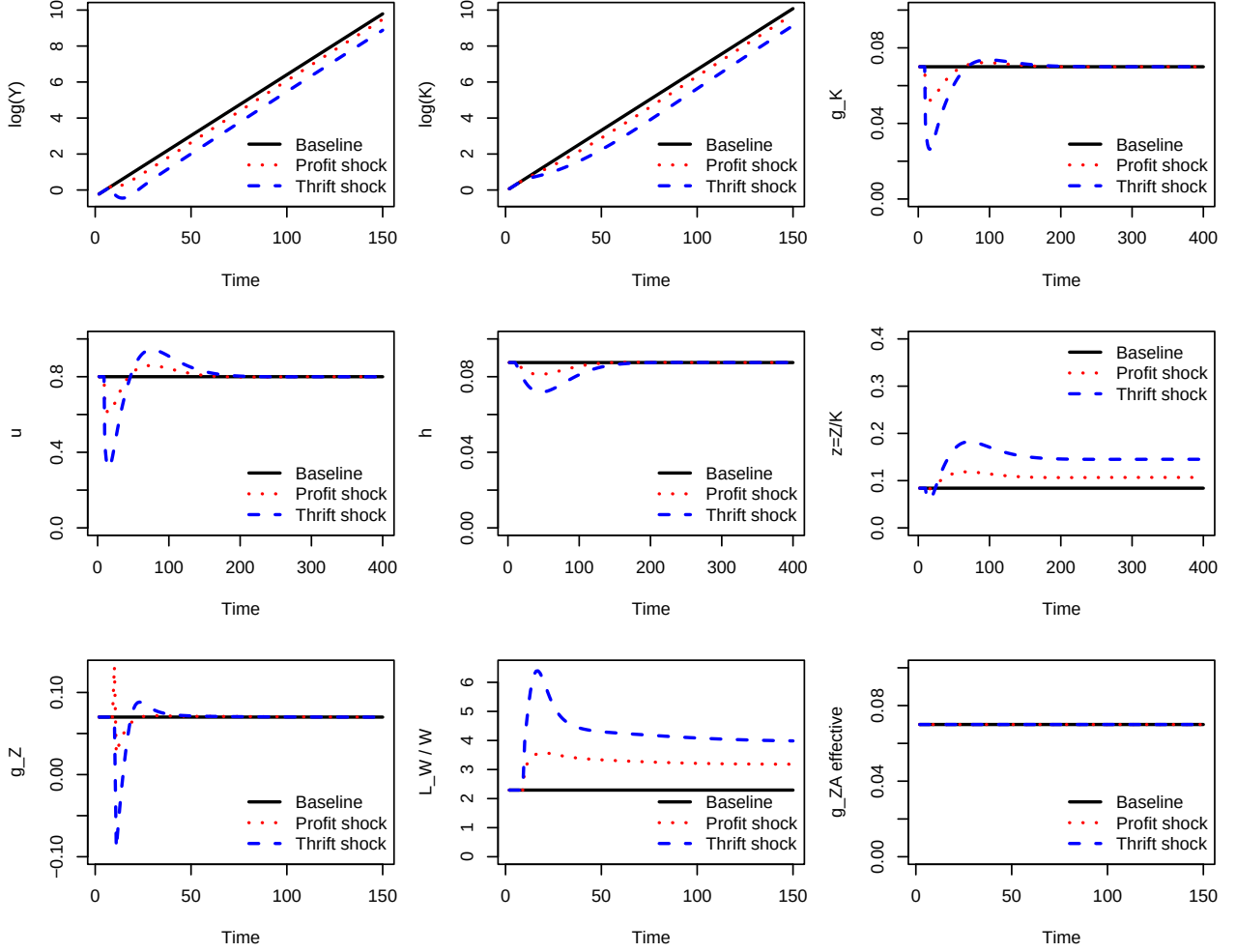


Figure 3: SFC-SSM with Endogenous Credit-Financed Consumption (Low Leverage Sensitivity)

and accumulation dynamics is (however only minimally) smaller. This follows from the inclusion of both the profit share π and lagged credit-financed consumption $C_{L,-1}$ in the determination of the level of credit-financed consumption. Nevertheless, for stable parameterizations, these deviations are not permanent. In the long run, the growth rate of credit-financed consumption converges back to the growth rate of its exogenous component, g_{ζ_0} .

A particularly interesting feature of the model concerns the dynamics of workers' debt-to-income ratios (lower middle panel). As can be seen, the debt-to-income ratio initially overshoots before stabilizing at a higher long-run equilibrium level, consistent with the findings of Pariboni (2016) and Mandarino et al. (2020). The overshoot relative to the new steady state is greater for the thrift shock, since the profit share at least partially contributes positively to autonomous demand.

Since workers' debt-to-income ratios now directly affect credit-financed demand, a sufficiently strong sensitivity parameter ζ_3 can generate a temporary contraction of credit-financed consumption during the traverse. In order to model such a credit crunch resulting from excessively high workers' debt-to-income ratios, the extended model incorporates an additional mechanism

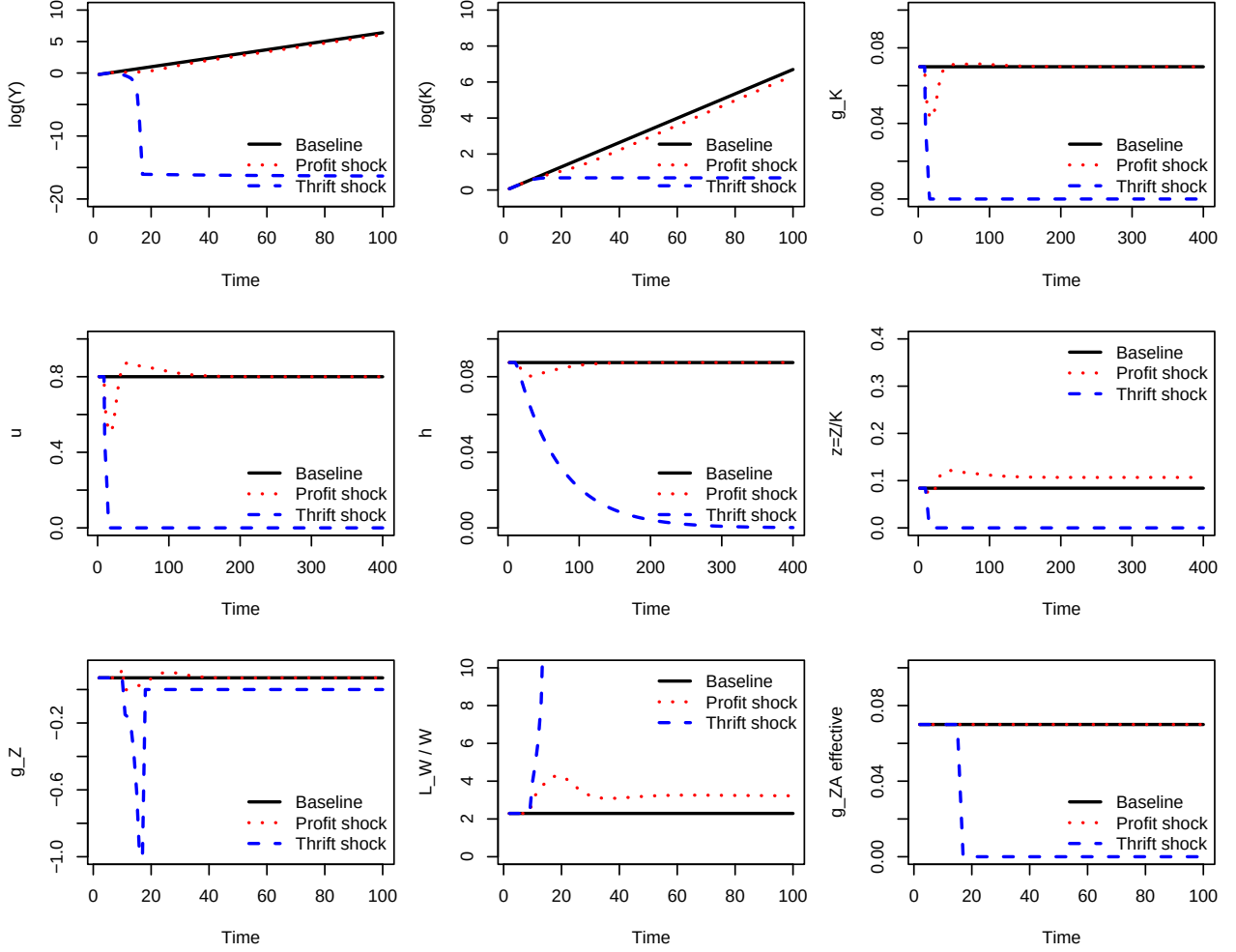


Figure 4: SFC-SSM with Endogenous Credit-Financed Consumption (High Leverage Sensitivity)

under which the growth rate of the autonomous component of credit-financed consumption collapses if the level of Z is pushed toward zero. Intuitively, this reflects the idea that when banks become unwilling to extend further credit because household indebtedness has become excessively high, it is no longer plausible to assume that lending continues to grow exogenously.

With this additional mechanism, the economy converges toward a zero-growth regime whenever the sensitivity of credit-financed consumption to the debt-to-income ratio becomes sufficiently large. Since the overshoot of workers debt-to income rate is greater for the thrift shock, the threshold value of the ζ_3 parameter for autonomous demand to collapse is lower for the thrift shock than for the profit shock. Figure 4 shows the scenario where ζ_3 is above the threshold for the thrift shock but below the threshold for the profit shock. The simulations therefore support the concerns raised by Nikiforos (2018): even if stable debt-to-income ratios are eventually reached in the long run, the economy may nevertheless experience severe instability or collapse during the traverse.

4.3 SFC-SSM with Exports

For the export-driven version of the simulated SFC-SSM, the accounting framework is extended to include a foreign sector (Rest of the World, RoW). For simplicity, it is assumed that the RoW holds its savings exclusively in the form of deposits at domestic banks and, in the case of a current account deficit, borrows from domestic banks to finance imports. Accordingly, both the balance-sheet matrix and the transaction-flow matrix are adjusted to incorporate foreign saving and foreign borrowing. Exports and imports are incorporated into the model in the following way:

$$X_t = (x_1 e_{r,t} + x_2) Y_{f,t} \quad (4.10)$$

$$M_t = (-\xi_1 e_{r,t} + \xi_2) Y_t \quad (4.11)$$

Table 7: Balance-Sheet Matrix (Export-driven SFC-SSM)

	Workers	Capitalists	Firms	Government	Banks	RoW	Total
Capital			$+K$				$+K$
Deposits	$+D_W$	$+D_C$			$-D$	$+D_{RoW}$	0
Loans			$-L_F$		$+L$	$-L_{RoW}$	0
Balance	$-V_W$	$-V_C$	$-V_F$	$-V_G$	$-V_B$	$-V_{RoW}$	$-K$
Sum	0	0	0	0	0	0	0

Table 8: Transaction Flow Matrix (Export-driven SFC-SSM)

	Workers	Capitalists	Firms	Government	Banks	RoW	Total
			Current	Capital			
Transactions							
Autonomous Demand (Z)							
Exports			+X			−X	0
Consumption (income)	−C _{YW}	−C _{YC}	+C _Y				0
Investment			+I	−I			0
Government spending			+G _T	−G _T			0
Imports			−M			+M	0
[Memo: GDP]			Y				
Taxes	−T _W	−T _C		+T			0
Wages	+W		−W				0
Firms profits		+Π	−Π				0
Net lending	NL _W	NL _C		NL _F	NL _G	NL _B NL _{CB}	0
Flow of Funds							
Δ in loans				+ΔL _F		−ΔL +ΔL _{RoW}	0
Δ in deposits	−ΔD _W	−ΔD _C				+ΔD −ΔD _{RoW}	0
Total	0	0	0	0	0	0 0	0

The extended SFC-SSM with endogenous autonomous exports is once again initialized at its long-run steady state, using the same general parameterization as the other variants of the SFC-

SSM. However, because the profit share is now treated as an endogenous variable, the structure of the model must be extended accordingly to account for the endogenization of distribution. Consequently, the simple profit-share shock is replaced by a 20% shock applied to all variables determining the profit share (i.e. the mark-up, the wage rate, the nominal exchange rate, and the import intensity of output).

The shock to the foreign price level is treated as a special case in order to illustrate the more extended dynamics of the model. Rather than assuming a one-time increase in the foreign price level, the foreign inflation shock is introduced as a permanent inflation rate (i.e. a continuous change in the price level) of 1.5%. For simplicity, the simulation focuses exclusively on distributional shocks, while the thrift shock is omitted. The simulation results are reported in Figures 5 and 6.

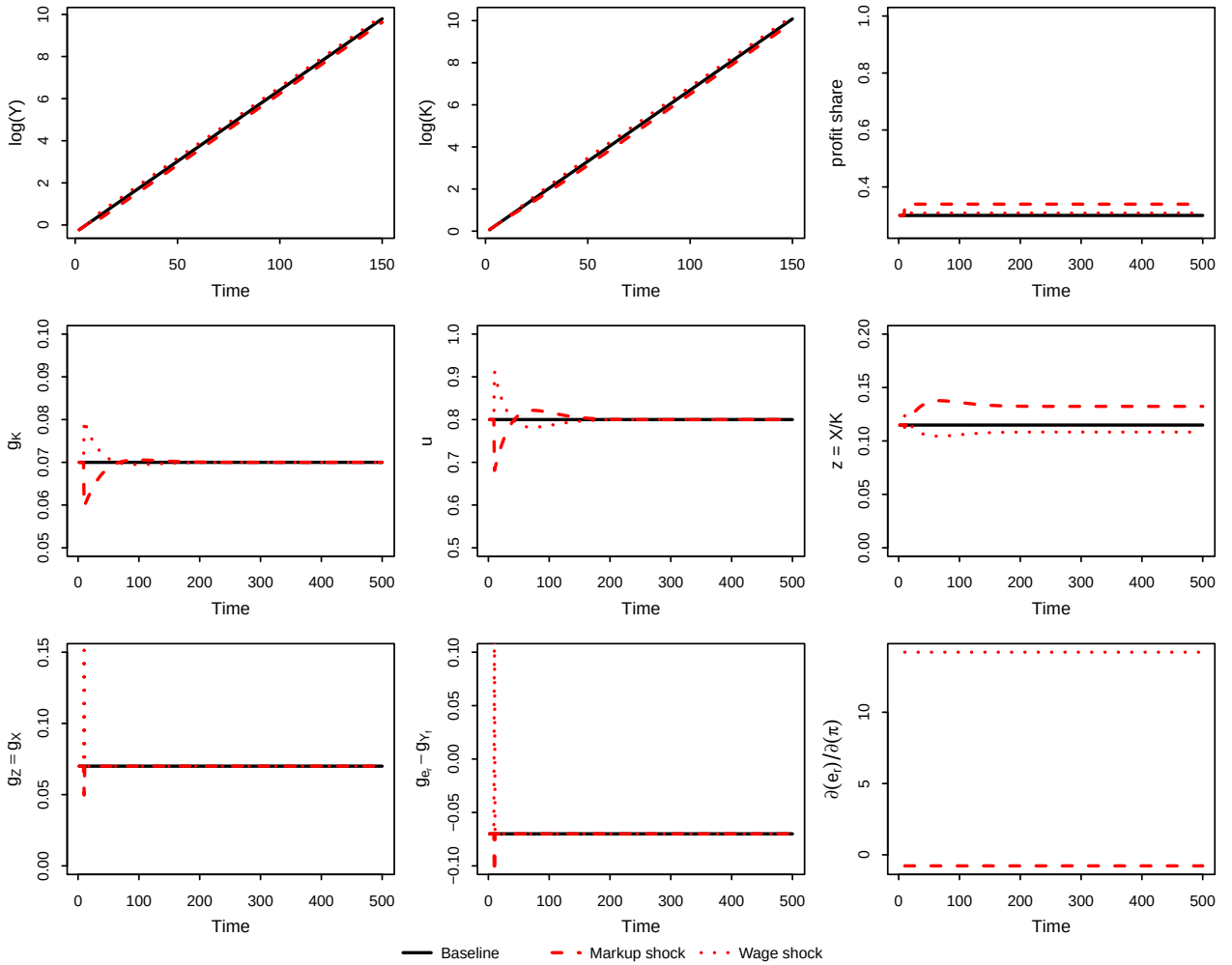


Figure 5: SFC-SSM with Endogenous Exports (a)

The shocks to the mark-up, the wage rate, the nominal exchange rate, and the import intensity of output generate the well-known dynamics of the canonical SSM. Although the growth paths are permanently shifted, the rate of capital accumulation eventually returns to its baseline steady state, where it equals the growth rate of exports. In the simulation, the baseline growth rate of exports is determined by the growth of foreign income, which is treated as an exogenous

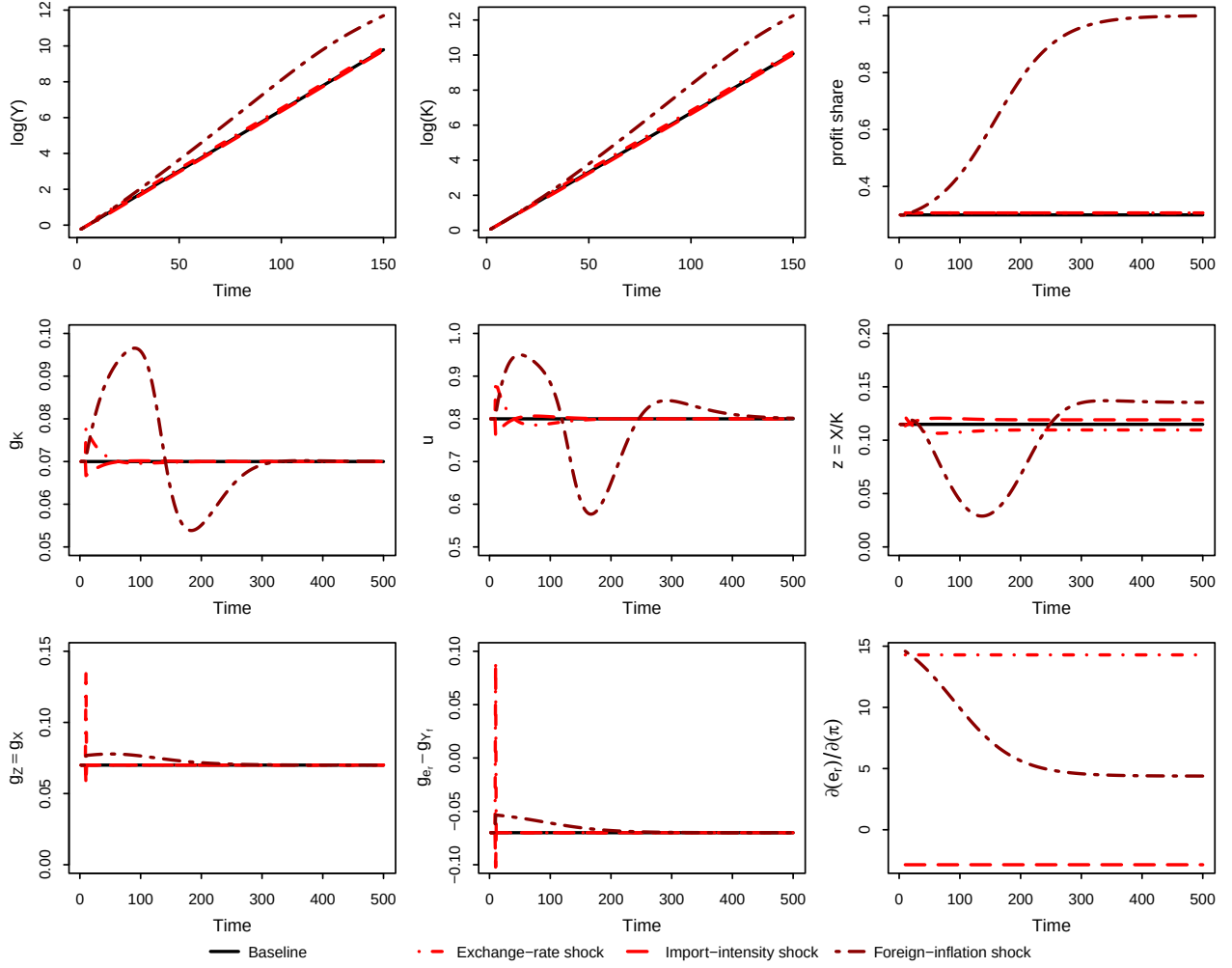


Figure 6: SFC-SSM with Endogenous Exports (b)

variable. The aforementioned shocks therefore induce only a one-period deviation in export growth. After the shock period, g_X immediately returns to its baseline level.

At the same time, the profit share, the ratio of autonomous demand to capital, and the real exchange rate are permanently shifted. However, consistent with SSM theory, the effects on the rate of capital accumulation and capacity utilization gradually vanish over time.

More interesting are the effects of the foreign inflation shock. As shown in Figure 6, the permanent increase in the foreign price level continuously raises the profit share (upper-right panel) while simultaneously worsening price competitiveness (lower-right panel). Nevertheless, these dynamics are naturally bounded, since the profit share cannot exceed unity. Once the profit share converges toward one, the dynamics dissipate, and both the growth rate of exports and the rate of capital accumulation return to their exogenous steady-state values. As illustrated in the lower-middle panel of Figure 6, the differential between the growth rates of the real exchange rate and foreign income—upon which the entire distributional effect on export growth depends according to equation 3.17—cannot therefore be sustained in the long run.

These dynamics become even clearer when reconsidering equation 3.15. An increase in foreign

inflation raises both the numerator and the denominator of the real exchange rate. Initially, the numerator effect dominates, generating a temporary increase in g_{er} . However, because imported intermediate inputs enter domestic production costs through the term p_{fel} , higher foreign prices gradually feed into domestic prices as well. Over time, this imported-cost effect offsets the initial competitiveness effect, causing the growth rate of the real exchange rate to converge back toward zero. Consequently, the foreign inflation shock produces a medium-run deviation in g_{er} rather than a permanent one.

It should be noted, however, that the dynamics generated by the foreign inflation shock would not occur in such a simplified form in reality. The sustained increase in domestic prices resulting from imported inflation would almost inevitably trigger domestic distributional conflict and price–wage spiral dynamics or changes in the nominal exchange rate. Incorporating conflict inflation and exchange rate regimes would therefore provide additional insights into the adjustment process. Such an extension, however, lies beyond the scope of the present paper.

Overall, the simulations confirm both the short-run results of Hein (2023a, Ch. 4) and the long-run implications of the canonical supermultiplier theory, subject to one important qualification. When changes in the profit share are driven by a persistent inflation differential between the domestic economy and the rest of the world, the growth rate may deviate from its fully adjusted position for extended periods of time. This can be interpreted as an intermediate case between the Sraffian long-run neutrality result and the Kaleckian view that distribution exerts persistent long-run effects on growth.

5 Discussion

The analysis of possible channels through which autonomous demand may become endogenous yield mixed results, depending on the component of autonomous demand under consideration. Overall, the findings support the argument of Serrano et al. (2023) that the Supermultiplier framework is more flexible with respect to endogenous autonomous demand than is sometimes assumed by its critics. At the same time, the results are broadly consistent with the interpretation of Lavoie (2016) and Dutt (2019), according to which distribution and thriftiness primarily affect average growth rates and traverse dynamics rather than long-run equilibrium utilization. A central contribution of the present analysis is that this conclusion appears to hold even when components of autonomous demand are treated as partially endogenous to functional income distribution.

As argued in Section 3, retaining the paradoxes of cost and thrift in the long run necessarily requires the growth rate of autonomous demand to be endogenous to the saving propensity and the profit share. However, the literature reviewed in this paper suggests that such endogeneity in growth-rate terms, rather than in levels, is implausible for most components of autonomous demand.

For four out of five autonomous demand components considered, plausible forms of endogenization do not alter the general long-run results of the Supermultiplier model: convergence toward normal utilization and the independence of long-run equilibrium capital accumulation from functional income distribution and changes in the propensity to save. These results, however, do not hold unconditionally. The analysis points to several important qualifications, boundary conditions, and potentially unstable traverse dynamics. The simulations also show that long-run steady states may be reached only after very long adjustment periods. In this respect, the findings support the critique of Gallo (2022), according to which Supermultiplier steady states may have limited relevance over empirically meaningful time horizons. In the short run and during the traverse, however, it matters considerably whether autonomous demand is treated as exogenous or endogenous.

With regard to consumption out of wealth, the analysis shows that, contrary to the results of Brochier and Macedo e Silva (2019), it cannot serve as an independent growth-driving source of autonomous demand. If stock-flow consistency is taken seriously, and if no other sector permanently accumulates financial liabilities that allow for persistent net leakages from household demand, then household wealth cannot grow indefinitely in a way that sustains continuously growing consumption out of wealth. Under these conditions, positive consumption out of wealth leads to a zero-growth steady state with below-normal capacity utilization. The Supermultiplier mechanism therefore breaks down and does not restore normal capacity utilization. Profit and thrift shocks do not alter this result. They only accelerate the convergence toward the zero-growth and low-utilization steady state when the system is initially out of equilibrium. In terms of the broader debate on the Supermultiplier model, this suggests that consumption out of wealth should, strictly speaking, not be regarded as a component of autonomous demand. Put differently, the definition of induced demand would have to be extended to include not only current income but also past income.

The endogeneity of credit-financed consumption is supported by a broad theoretical and empirical literature. However, this literature suggests a functional form in which the level of credit-financed consumption, rather than its growth rate, is endogenous. This differs from the specification proposed by Avritzer and Brochier (2025). With such level endogeneity, the long-run effects of distribution and thriftiness cannot be established. This remains the case even when a partial autoregressive mechanism is included in the credit-financed consumption function. If the coefficient on lagged credit-financed consumption is smaller than one, shocks die out over time. Only if this coefficient were larger than one would a growth-rate effect arise, but such an assumption would be implausible. With endogeneity in levels, the long-run growth rate converges back to the growth rate of the independent component of credit-financed consumption.

Nevertheless, the simulations show that the growth mechanism of the SSM may break down if the sensitivity of autonomous credit-financed consumption to the debt-to-income ratio exceeds a certain threshold. This result depends on the assumption that a collapse of credit-financed

consumption also prevents the independent growth of credit-financed consumption unless an additional exogenous stimulus occurs. The finding supports the concerns raised by Nikiforos (2018). It also suggests that breakdowns may occur during the traverse toward new long-run debt-to-income ratios, even if these new steady-state ratios would themselves be sustainable. This also helps resolve a central puzzle of the SSM approach: its apparent difficulty in explaining financial crises such as the crisis of 2008. In the canonical model, borrowing is ultimately stabilizing because it generates growth. Once credit-financed consumption is made sensitive to financial fragility, however, borrowing can become destabilizing during the adjustment process.

A more plausible candidate for an autonomous demand component whose growth rate may be affected by functional income distribution and thriftiness is residential investment. Building on the findings of Teixeira and Petrini (2023) and Petrini and Teixeira (2023), which suggest that residential investment growth is driven by the own rate of return on housing, the analysis extends this mechanism by considering the effect of inequality on house-price inflation discussed in the literature, although the empirical evidence remains ambiguous.

With regard to government spending, I have argued, contrary to much of the existing literature, that only deficit spending should be regarded as a component of autonomous demand. Similar to the argument concerning wealth-financed consumption, this follows from a circuitist perspective. Even if all government spending could hypothetically be interpreted as freely determined by independent political decisions, and even if all government spending is initially financed through central bank money creation, subsequent tax collection represents a monetary leakage. Considering the monetary circuit as a whole, the net injection of purchasing power is therefore limited to the deficit-financed component of government spending.

Based on the existing, though inconclusive, literature on the political economy of government spending, the analysis suggests that potential effects of distribution operating through class struggle, power resources, and labor-cost dynamics are unlikely to alter the long-run results of the canonical Supermultiplier model.

Finally, the open-economy case, in which exports play the role of partially endogenous autonomous demand, is more complex for several reasons. As shown by Kaleckian authors such as Hein (2023a), under Kaleckian cost-plus pricing, functional income distribution is endogenous to the real exchange rate and therefore to a number of related variables. Endogenizing export demand with respect to these variables does not, by itself, change the core properties of the Supermultiplier model. Even if a persistent inflation differential between the domestic economy and its trading partners is assumed, with no adjustment through the nominal exchange rate, the simulations show that in the very long run the rate of capital accumulation converges back to its baseline path and utilization returns to its normal level as the profit share converges toward unity. This is, of course, a purely hypothetical case, since neither a complete absence of nominal exchange-rate adjustment nor a complete absence of reactions in wage bargaining and domestic inflation can realistically be expected.

Several critiques of the SSM approach could not be ruled out by the present analysis, or could not be considered in sufficient detail, and therefore deserve to be emphasized. First, all models considered here assume stable parameters. However, it cannot be ruled out that these parameters change over time for reasons not discussed in this thesis. As Hein (2023b) argues, such changes in behavioral parameters have been identified in several empirical studies. This is not a problem specific to the Supermultiplier framework but a general issue in macroeconomic modelling.

Second, the analysis leaves open why autonomous demand components should contain exogenous growth components at all. In most simulations and partial endogeneity functions, I assumed that, in addition to the endogeneity channels, there are growing components that are not affected by income and distribution. This is also an unresolved issue in the response by Serrano et al. (2023) to the critique of endogenous autonomous demand. It therefore remains to be studied why these components grow in the first place. One possibility is that their growth is partly random or historically contingent.

Third, it would be valuable to consider extreme cases, such as a zero profit share. In the canonical model, and also in the results of the present analysis, the profit share has no long-run effect on utilization. Yet it would be counterintuitive to assume that firms continue to invest when profits vanish entirely. This leaves room for a Bhaduri-Marglin type intervention in which profitability imposes limits on the neutrality results of the Supermultiplier model.

6 Concluding Remarks

The present paper has situated the Supermultiplier (SSM) approach within the broader tradition of post-Keynesian growth theory. Its main contributions are twofold. First, it has provided a systematic overview of the historical development and contemporary state of the SSM literature, showing that the approach has evolved into a mature and rapidly developing strand of post-Keynesian growth theory. Second, and more importantly, it has addressed one of the central unresolved issues in the literature: the endogeneity of autonomous demand.

The analysis has shown that the Supermultiplier model constitutes a promising framework for reconciling exogenous functional income distribution, convergence toward normal capacity utilization, and the long-run version of the Keynesian hypothesis according to which investment is independent of saving. Despite advances in the SSM literature, one important limitation has remained largely unaddressed: the relationship between autonomous demand, income distribution, and financial conditions. This omission is particularly important because autonomous demand represents the central driving force within SSM theory. Understanding its determinants is therefore essential for the further development of the framework.

Existing attempts to endogenize autonomous demand have been shown to provide useful starting points, but they also suffer from significant shortcomings. Therefore, this paper drew on a

broad theoretical and empirical literature to identify the determinants of the five components of autonomous demand emphasized in SSM theory. The modelling exercises and simulation results broadly confirm the general properties of the canonical model with exogenous autonomous demand. However, several important qualifications emerge.

First, consumption out of wealth should not be regarded as a genuine component of autonomous demand. Since it is ultimately dependent on accumulated past income and financial balances elsewhere in the economy, it cannot independently sustain growth. Second, credit-financed consumption is strongly influenced by income distribution and macroeconomic conditions, but this does not fundamentally alter the long-run results of the Supermultiplier model. Nevertheless, the analysis confirms concerns that financial instability during the traverse toward new steady states may disrupt the growth and stabilization mechanisms of the model. Third, the paper argues that the widespread practice of treating all government spending as autonomous demand is conceptually misleading. From a circuitist perspective, only deficit-financed government expenditure should be regarded as autonomous demand in the SSM sense, since 'tax-financed' spending merely redistributes existing purchasing power rather than constituting a net injection. Finally, the paper has extended the analysis of endogenous functional income distribution to an open-economy SSM framework. While these dynamics have previously been explored primarily within Kaleckian models, the present analysis shows that incorporating them into the SSM does not fundamentally alter the long-run neutrality results regarding utilization and growth.

Several limitations remain and point toward promising avenues for future research. Most importantly, this paper has focused primarily on individual endogeneity channels in isolation. Interactions between channels may be highly relevant but could not be studied in sufficient depth due to space constraints. For example, strong interactions are likely between residential investment and credit-financed consumption because housing wealth often serves as collateral. Likewise, government spending may influence financial stability through multiple indirect channels. Studying such interactions remains an important task for future research.

A second limitation concerns inflation. Although inflation enters several mechanisms discussed throughout the paper, it has not been integrated systematically into the analysis of endogenous autonomous demand. This omission is important because inflation affects stock and flow valuations and may therefore alter several of the mechanisms investigated here.

Finally, one broader methodological point deserves emphasis. Theoretical modelling exercises are only as useful as the assumptions on which they are built. Their value lies in showing how different assumptions shape the dynamics of an interconnected macroeconomic system. Yet these assumptions themselves require empirical scrutiny. Without such scrutiny, theoretical modelling risks becoming detached from the phenomena it seeks to explain. Conducting this empirical work was beyond the scope of the present thesis. Nevertheless, future research should subject the mechanisms and assumptions discussed here to systematic empirical testing. In this sense, the present paper should be understood as an invitation for further research into

the empirical foundations of autonomous demand and its endogeneity—an effort that may contribute to making Supermultiplier growth theory more comprehensive, empirically grounded, and theoretically robust.

7 References

- Arestis, P. and A. R. González-Martínez (2015). “Residential Construction Activity in OECD-Economies”. In: *The Manchester School* 83.4, pp. 451–474. DOI: 10.1111/manc.12072.
- Avritzer, J. D. and L. Brochier (2025). “Credit-financed household consumption and the debt service ratio: tackling endogenous autonomous demand in the Supermultiplier model”. In: *Review of Keynesian Economics* 13.1, pp. 21–50.
- Avritzer, J. D. and M. C. B. Goes (2023). “Monetary Policy, Income Distribution and Autonomous Demand in the US”. In: *Conference paper presented at the FMM Conference 2023*.
- Barba, A. and M. Pivetti (2008). “Rising household debt: Its causes and macroeconomic implications—a long-period analysis”. In: *Cambridge Journal of Economics* 33.1, pp. 113–137. DOI: 10.1093/cje/ben030.
- BMF (2026). *Der Arbeitskreis „Steuerschätzungen“*. URL: <https://www.bundesfinanzministerium.de/Content/DE/Standardartikel/Themen/Steuern.html> (visited on 05/31/2026).
- Brady, D. and H. Y. Lee (2014). “The rise and fall of government spending in affluent democracies, 1971–2008”. In: *Journal of European Social Policy* 24.1, pp. 56–79. DOI: 10.1177/0958928713511281.
- Brochier, L. (2020). “Conflicting-claims and labour market concerns in a supermultiplier SFC model”. In: *Metroeconomica* 71.3, pp. 566–603. DOI: 10.1111/meca.12289.
- Brochier, L. and A. C. Macedo e Silva (2019). “A Supermultiplier Stock-Flow Consistent model: the “return” of the paradoxes of thrift and costs in the long run?” In: *Cambridge Journal of Economics* 43.2, pp. 413–442.
- Brown, C. (2008). *Inequality, consumer credit and the saving puzzle*. New directions in modern economics series. Cheltenham (GB): E. Elgar. ISBN: 978-1-84720-509-4.
- Caminati, M. and S. Sordi (2019). “Demand-led growth with endogenous innovation”. In: *Metroeconomica* 70.3, pp. 405–422. DOI: 10.1111/meca.12243.
- Cesaratto, S. (2015). “Neo-Kaleckian and Sraffian Controversies on the Theory of Accumulation”. In: *Review of Political Economy* 27.2, pp. 154–182. DOI: 10.1080/09538259.2015.1010708.
- Cynamon, B. Z. and S. M. Fazzari (2008). “Household Debt in the Consumer Age: Source of Growth–Risk of Collapse”. In: *Capitalism and Society* 3.2. DOI: 10.2202/1932-0213.1037.
- De Mello, L. and E. R. Tiongson (2006). “Income Inequality and Redistributive Government Spending”. In: *Public Finance Review* 34.3, pp. 282–305. DOI: 10.1177/1091142105284894.
- Dejuán, Ó. (2017). “Hidden links in the warranted rate of growth: the supermultiplier way out”. In: *The European Journal of the History of Economic Thought* 24.2, pp. 369–394. DOI: 10.1080/09672567.2016.1186201.

- Deleidi, M. et al. (2019a). “Sraffian Supermultiplier, Mission-Oriented Innovation Policies and Ecological Sustainability: A Stock-Flow Dynamic Model”. In: *Working Paper Series (IIPP WP 2019-01)*.
- (2019b). “Supermultiplier, innovation and the ecosystem: A stock-flow dynamic model”. In: *Paper Series (IIPP WP 2019-01)*.
- Di Bucchianico, S. et al. (2024). “Debt-credit Flows and Stocks in a Supermultiplier Model with Two Autonomous Demand Components: Consequences for Growth”. In: *Review of Political Economy* 36.5, pp. 1894–1914. DOI: 10.1080/09538259.2024.2375298.
- Di Domenico, J. and A. Russo (2022). “Innovation, growth, and productivity appropriation. How the elites learned to stop worrying and love public debt”. In: *Working paper*.
- Di Domenico, L. et al. (2024). “The Monetary Theory of Production and the Supermultiplier: What Determines Savings?” In: *Review of Political Economy* 36.5, pp. 1746–1774. DOI: 10.1080/09538259.2024.2378373.
- Dutt, A. K. (2006). “Maturity, Stagnation and Consumer Debt: A Steindlian Approach”. In: *Metroeconomica* 57.3, pp. 339–364. DOI: 10.1111/j.1467-999X.2006.00246.x.
- (2008). “The Dependence Effect, Consumption and Happiness: Galbraith Revisited”. In: *Review of Political Economy* 20.4, pp. 527–550. DOI: 10.1080/09538250802308919.
- (2019). “Some observations on models of growth and distribution with autonomous demand growth”. In: *Metroeconomica* 70.2, pp. 288–301. DOI: 10.1111/meca.12234.
- Egebo, T. and I. Lienert (1988). *Modelling Housing Investment for Seven Major OECD Countries*. OECD Economics Department Working Papers 63. Series: OECD Economics Department Working Papers Volume: 63. DOI: 10.1787/062214542760.
- Facchini, F. (2018). “What Are the Determinants of Public Spending? An Overview of the Literature”. In: *Atlantic Economic Journal* 46.4, pp. 419–439. DOI: 10.1007/s11293-018-9603-9.
- Facchini, F. et al. (2017). “Labour Costs and the Size of Government”. In: *Oxford Bulletin of Economics and Statistics* 79.2, pp. 251–275. DOI: 10.1111/obes.12140.
- Farnsworth, K. (2005). “International Class Conflict and Social Policy”. In: *Social Policy and Society* 4.2, pp. 217–226. DOI: 10.1017/S1474746404002301.
- Ferguson, T. et al. (2020). “How Much Can the U.S. Congress Resist Political Money? A Quantitative Assessment”. In: *Institute for New Economic Thinking Working Paper Series*, pp. 1–59. DOI: 10.36687/inetwp109.
- Fiebiger, B. (2021). “The post-Keynesian "crowding-in" policy meme: Government-led semi-autonomous demand growth”. In.

- Fiebiger, B. (2024). “Finance, Financial Adjustments and Alternative Closures in Neo-Kaleckian Models: The Paradoxes of Thrift and Costs in the Long-Run.” In: *Review of Political Economy* 36, pp. 1722–1745. DOI: 10.1080/09538259.2024.2338403.
- Foley, D. K. (1978). “State expenditure from a Marxist perspective”. In: *Journal of Public Economics* 9.2, pp. 221–238. DOI: 10.1016/0047-2727(78)90044-0.
- Frank, R. H. et al. (2014). “Expenditure Cascades”. In: *Review of Behavioral Economics* 1.1, pp. 55–73. DOI: 10.1561/105.000000003.
- Freitas, F. and F. Serrano (2015). “Growth Rate and Level Effects, the Stability of the Adjustment of Capacity to Demand and the Sraffian Supermultiplier”. In: *Review of Political Economy* 27.3, pp. 258–281. DOI: 10.1080/09538259.2015.1067360.
- Gallo, E. (2022). “When is the long run?—Historical time and adjustment periods in demand-led growth models”. In: *Metroeconomica* 73.4, pp. 1155–1178. DOI: 10.1111/meca.12400.
- (2026). “Public Investment as a Source of Capacity-Creating Autonomous Demand: Implications for Growth and Stability”. In: *Review of Political Economy* 38.1, pp. 245–259. DOI: 10.1080/09538259.2024.2373743.
- Gao, M. et al. (2023). “Consumer behaviour and credit supply: Evidence from an Australian FinTech lender”. In: *Finance Research Letters* 57, p. 104205. DOI: 10.1016/j.fr1.2023.104205.
- Goda, T. et al. (2019). “Absolute income inequality and rising house prices”. In: *Socio-Economic Review* 0.0, pp. 1–36.
- Gonzalez, F. (2015). “Where are the Consumers?: ‘Real households’ and the financialization of consumption”. In: *Cultural Studies* 29.5, pp. 781–806. DOI: 10.1080/09502386.2015.1017144.
- Guan, T. (2017). “Income Inequality, Rapidly Rising Housing Prices and Overdevelopment of Houses in China”. In: *AllDissertations*. 1902.
- Hailemariam, A. et al. (2021). “Income inequality and housing prices in the very long-run”. In: *Southern Economic Journal* 88.1, pp. 295–321. DOI: 10.1002/soej.12520.
- Hein, E. (2012). “Finance-dominated capitalism, re-distribution, household debt and financial fragility in a Kaleckian distribution and growth model”. In: *PSL Quarterly Review* 65.260, pp. 11–51.
- (2014). *Distribution and growth after Keynes: a post-Keynesian guide*. Cheltenham: E. Elgar. ISBN: 978-1-78347-728-9.
- (2023a). *Macroeconomics after Kalecki and Keynes: Post-Keynesian Foundations*. Edward Elgar Publishing. ISBN: 978-1-80392-728-2 978-1-80392-727-5. DOI: 10.4337/9781803927282.

- Hein, E. (2023b). “Varieties of demand and growth regimes – post-Keynesian foundations”. In: *European Journal of Economics and Economic Policies Intervention* 20.3, pp. 410–443. DOI: 10.4337/ejeep.2023.0103.
- (2024). “The principle of effective demand in the short and the long run: Marx, Kalecki, Keynes, and beyond”. In: *Working Paper, No. 235/2024, Hochschule für Wirtschaft und Recht Berlin, Institute for International Political Economy (IPE)*.
- Kalecki, M. (1943). “Political Aspects of Full Employment”. In: *Political Quarterly*.
- Kapeller, J. and B. Schütz (2015). “Conspicuous Consumption, Inequality and Debt: The Nature of Consumption-driven Profit-led Regimes”. In: *Metroeconomica* 66.1, pp. 51–70. DOI: 10.1111/meca.12061.
- Kohlscheen, E. et al. (2020). “Residential Investment and Economic Activity: Evidence from the Past Five Decades”. In: *International Journal of Central Banking* 16.6, pp. 287–329.
- Lavoie, M. (2016). “Convergence Towards the Normal Rate of Capacity Utilization in Neo-Kaleckian Models: The Role of Non-Capacity Creating Autonomous Expenditures”. In: *Metroeconomica* 67.1, pp. 172–201. DOI: 10.1111/meca.12109.
- (2022). *Post-Keynesian Economics: New Foundations*. Edward Elgar Publishing. ISBN: 978-1-83910-962-1 978-1-83910-961-4. DOI: 10.4337/9781839109621.
- Määttänen, N. and M. Terviö (2014). “Income distribution and housing prices: An assignment model approach”. In: *Journal of Economic Theory* 151, pp. 381–410. DOI: 10.1016/j.jet.2014.01.003.
- Mandarino, G. V. et al. (2020). “Workers’ debt-financed consumption: a supermultiplier stock–flow consistent model”. In: *Review of Keynesian Economics* 8.3, pp. 339–364. DOI: 10.4337/roke.2020.03.03.
- Matthews, R. (1959). *The Trade Cycle*. Cambridge: J. Nisbet.
- Meltzer, A. H. and S. F. Richard (1981). “A Rational Theory of the Size of Government”. In: *Journal of Political Economy* 89.5, pp. 914–927. URL: <http://www.jstor.org/stable/1830813>.
- Morlin, G. S. and R. Pariboni (2023). “Conflict inflation and autonomous demand: a supermultiplier model with endogenous distribution.” In: *Quaderni del Dipartimento di Economia Politica e Statistica No. 902*.
- Morlin, G. S. et al. (2024). “Growth Theory and the Growth Model Perspective: Insights from the Supermultiplier”. In: *Review of Political Economy* 36.3, pp. 1130–1155. DOI: 10.1080/09538259.2022.2092998.
- Murray, J. (2024). “Fiscal policy reactions and impact over the labor income distribution”. In: *Economic Analysis and Policy* 83, pp. 701–718. DOI: 10.1016/j.eap.2024.07.007.

- Nakajima, M. (2005). “Rising Earnings Instability, Portfolio Choice, and Housing Prices”. In: *SSRN Electronic Journal*. DOI: 10.2139/ssrn.1480816.
- Nikiforos, M. (2013). “The (Normal) Rate of Capacity Utilization at the Firm Level”. In: *Metroeconomica* 64.3, pp. 513–538. DOI: 10.1111/meca.12016.
- (2018). “Some comments on the Sraffian Supermultiplier approach to growth and distribution”. In: *Journal of Post Keynesian Economics* 41.4, pp. 659–675. DOI: 10.1080/01603477.2018.1486211.
- Nikiforos, M. et al. (2024a). “Residential and Nonresidential Investment and the Cycle: A Rejoinder”. In: *Review of Political Economy* 36.5, pp. 2116–2120. DOI: 10.1080/09538259.2022.2156726.
- (2024b). “The Sraffian Supermultiplier and Cycles: Theory and Empirics”. In: *Review of Political Economy* 36.5, pp. 2085–2104. DOI: 10.1080/09538259.2022.2156722.
- Oreiro, J. L. and J. F. C. Santos (2023). “The impossible quartet in a demand led growth-supermultiplier model for a small open economy”. In: *Brazilian Journal of Political Economy* 43.3, pp. 592–618. DOI: 10.1590/0101-31572023-3448.
- Oreiro, J. L. D. C. et al. (2020). “The debate about Sraffian Supermultiplier Model and the future of heterodox growth models”. In: *Brazilian Journal of Political Economy* 40.3, pp. 510–531. DOI: 10.1590/0101-31572020-3049.
- Pariboni, R. (2016). “Household consumer debt, endogenous money and growth: A supermultiplier-based analysis”. In: *PSL Quarterly Review*, 69.287, pp. 211–233.
- Petrini, G. and L. Teixeira (2023). “Determinants of Residential Investment Growth Rate in the US Economy (1992–2019)”. In: *Review of Political Economy* 35.3, pp. 702–719. DOI: 10.1080/09538259.2022.2149923.
- Russo, A. et al. (2016). “Increasing inequality, consumer credit and financial fragility in an agent based macroeconomic model”. In: *Journal of Evolutionary Economics* 26.1, pp. 25–47. DOI: 10.1007/s00191-015-0410-z.
- Ryoo, S. and Y. K. Kim (2014). “Income Distribution, Consumer Debt and Keeping up with the Joneses”. In: *Metroeconomica* 65.4, pp. 585–618. DOI: 10.1111/meca.12052.
- Serrano, F. (1995). “Long Period Effective Demand And The Sraffian Supermultiplier”. In: *Contributions to Political Economy* 14.1, pp. 67–90. DOI: 10.1093/oxfordjournals.cpe.a035642.
- Serrano, F. and F. Freitas (2017a). “Growth Rate and Level Effects, the Adjustment of Capacity to Demand and the Sraffian Supermultiplier”. In: *Working Paper*.
- (2017b). “The Sraffian supermultiplier as an alternative closure for heterodox growth theory”. In: *European Journal of Economics and Economic Policies: Intervention* 14.1, pp. 70–91. DOI: 10.4337/ejeep.2017.01.06.

- Serrano, F. et al. (2023). “Autonomous Demand-led growth and the Supermultiplier: the theory, the model and some clarification”. In: *IE-UFRJ Discussion Paper. 003 / 2023*.
- Setterfield, M. and Y. K. Kim (2016). “Debt servicing, aggregate consumption, and growth”. In: *Structural Change and Economic Dynamics* 36, pp. 22–33. DOI: 10.1016/j.strueco.2015.10.002.
- Skott, P. et al. (2022). “Supermultipliers, ‘endogenous autonomous demand’ and functional finance”. In: *Metroeconomica* 73.1, pp. 220–244. DOI: 10.1111/meca.12360.
- Starr, M. A. (2010). “Debt-Financed Consumption Sprees: Regulation, Freedom and Habits of Thought”. In: *Journal of Economic Issues* 44.2, pp. 459–470. DOI: 10.2753/JEI0021-3624440218.
- Summa, R. (2022). “Alternative uses of functional finance: Lerner, MMT and the Sraffians”. In: *Working Paper, No. 175/2022*.
- Summa, R. et al. (2024). “Cycles: Empirics and the Supermultiplier Theory”. In: *Review of Political Economy* 36.5, pp. 2105–2115. DOI: 10.1080/09538259.2022.2156725.
- Teixeira, L. and G. Petrini (2023). “Long-run effective demand and residential investment: a Sraffian supermultiplier based analysis”. In: *Review of Keynesian Economics* 11.1. DOI: 10.4337/roke.2023.01.05.
- Van Treeck, T. (2014). “Did Inequality Cause the U.S. Financial Crisis?” In: *Journal of Economic Surveys* 28.3, pp. 421–448. DOI: 10.1111/joes.12028.
- Zhang, F. (2016). “Inequality and House Prices”. In: *University of Michigan Working Paper*.