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Varieties and interdependencies of demand and growth regimes in finance-dominated capitalism: a post-Keynesian two-country stock-flow consistent simulation approach

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Abstract
We outline and simulate a stylised post-Keynesian two country stock-flow consistent model to demonstrate the interconnection of three of the main features/outcomes of finance-dominated capitalism, namely worsening income distribution for the bottom 90% households, the rise of international imbalances and the build-up of financial fragility. In the model, two basic regimes emerge, depending on the institutional setting of the respective model economy: the debt-led private demand boom regime (DLPD) and the export-led mercantilist regime (ELM). We demonstrate the complementarity and interdependence of these two regimes and show how this constellation transformed after the crisis into the domestic demand-led regime (DDL) stabilised by government deficits, on the one hand, and ELM regimes, on the other, depending on the required deleveraging of private household debt, distributional developments and fiscal policy.

Keywords: post-Keynesian macroeconomics, financialisation, growth regimes, institutions, inequality, debt, stock-flow consistent model
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1. Introduction

Post-Keynesian research has made extensive use of the notion of demand-led macroeconomic regimes. This has been particularly true for post-Kaleckian distribution and growth models, following the seminal work by Bhaduri and Marglin (1990) and Kurz (1990), which has also recently been introduced into the debate on varieties of capitalism in comparative political economy (CPE) (Baccaro and Pontusson 2016, 2018). In contrast to the initial neo-Kaleckian distribution and growth models by Dutt (1984, 1987) and Rowthorn (1981), Bhaduri and Marglin (1990) and Kurz (1990) showed that in a Kaleckian based demand-led growth model, wage- as well as profit-led regimes may emerge, depending in particular on the specification of the investment function (see Blecker and Setterfield 2020, Chapter 4; Hein 2014, Chapters 6-7; Lavoie 2014, Chapter 6). Previously, Blecker (1989) had also shown that a domestically wage-led demand and growth regime may turn profit-led through the effects of redistribution on net exports. These basic theoretical models have triggered rich econometric work trying to identify the dominating regime in different countries (and time periods).[1]

To clarify some misunderstandings in the CPE reception of the post-Kaleckian approach, identifying a country as wage-led or profit-led only provides information on the demand and growth effects of changes in the wage share (and the profit share, of course). It does not imply that in a wage-led demand and growth regime pro-labour distribution policies are necessarily applied, or that in profit-led demand and growth regime pro-capital policies will dominate (Lavoie and Stockhammer 2013). Therefore, this regime distinction only provides some basic information on the effects of functional re-distribution on demand and growth, but no indication yet on the sources and drivers of growth in particular countries during certain periods.

The latter have been the focus of research on the macroeconomics of financialisation, also known as finance-dominated capitalism, which has generated the notion of macroeconomic regimes in finance-dominated capitalism (Hein 2012; Stockhammer 2015). This was meant to distinguish different ways countries have tried to cope with the depressive macroeconomic effects of financialisation, the regressive re-distribution of income (i.e. falling labour income shares, rising wage dispersion and rising inequality in the distribution of household income), with negative effects on income-financed consumption, as well as depressed investment in real capital stock caused by the increasing shareholder value orientation of non-financial corporations' management, in particular. Looking at the growth contributions of the main demand aggregates (private consumption, public consumption, investment and net exports), as well as the financial balances of the main macroeconomic sectors (external, public, private household, corporations), the focus has been on the sources of GDP growth and the way expenditures have been financed (i.e. by income or credit). The two extreme and opposed regimes that have been derived for the period before the Global Financial Crisis (GFC) and the following Great Recession (GR) of 2007-09, were the 'debt-led

[1] For empirical results, see the general overview in Hein (2014, Chapter 7), and in Jimenez (2020) for emerging capitalist economies. For recent multi-country studies, see Hartwig (2014), Onaran and Obst (2016) and Onaran and Galanis (2014). For clarifying discussions on why empirical results generated by different empirical models and methods differ, see Blecker (2016) and Stockhammer (2017).

private demand boom' regime (DLPD) and the 'export-led mercantilist' regime (ELM). The former relies on debt-financed private (consumption) demand as the main source of demand and growth and may lead to rising private household debt-income ratios. The latter relies on foreign demand and may lead to rising indebtedness of the foreign sectors (see for example Dodig et al. 2016; Hein 2012, 2019).

Linking the research on wage-led vs. profit-led demand and growth regimes with the research on macroeconomic regimes in finance-dominated capitalism, it should be clear that certain countries may be wage-led, and may then be dominated by either a DLPD regime or an ELM regime, in order to cope with the depressive demand and growth effects imposed by redistribution at the expense of labour.

Recently, the post-Keynesian/Kaleckian demand-led regime approaches have resonated in the CPE literature (Baccaro and Pontusson 2016, 2018; Hope and Soskice 2016). In an attempt to overcome the implications of new consensus macroeconomics (NCM) as the supply side-dominated macroeconomic backbone of much of the CPE research, in particular the Varieties of Capitalism approach (i.e. Carlin and Soskice 2009, 2015; Hall and Soskice 2001; Hope and Soskice 2016), Baccaro and Pontusson (2016, 2018) have made use of the post-Keynesian categories of demand-led macroeconomic regimes outlined above. However, they have not properly taken into account the important analytical distinction between wage-led/profit-led regimes on the one hand, and DLPD/ELM regimes on the other (Hein et al. 2021). Post-Keynesians have also provided attempts at linking their demand and growth regime approaches to the CPE literature on institutional varieties of capitalism or on welfare state models in modern capitalism (Behringer and van Treeck 2018, 2019; Hein et al. 2021; Setterfield and Kim 2020; Stockhammer 2021; Stockhammer and Ali 2018).

Furthermore, a couple of years after the GFC and the GR, 2007-09, as a result of the contradictory nature of finance-dominated capitalism, several post-Keynesians have started to analyse the shifts of demand and growth regimes (Akcay et al. 2021; Dodig et al. 2016; Dünhaupt and Hein 2019; Hein 2019; Hein and Martschin 2020; Hein et al. 2021). As argued in particular by Hein (2019), Hein et al. (2021) and Hein and Martschin (2020), the type of shift experienced in previously DLPD economies has depended on the requirement of private sector deleveraging after the financial crisis, as well as on the ability and willingness to run deficit-financed and stabilising fiscal policies. The institutional constraints imposed on national fiscal policies in the Eurozone, the absence of relevant fiscal policies at the Eurozone level, and the turn towards austerity policies when the Eurozone crisis started in 2010, therefore explain to a large extent why European DLPD countries in particular turned ELM (or weakly export-led) after the GFC and the GR (Hein and Martschin 2020). Other pre-crisis DLPD countries, in particular the UK and the US, which were able to make use of expansionary deficit-financed fiscal policies, were in a position to compensate private deleveraging by rising public deficits, thus stabilising aggregate demand in their countries and turning to a domestic demand-led (DDL) regime stabilised by public deficits rather than ELM as in Europe (Hein 2019).

Kohler and Stockhammer (2021) have recently provided a more systematic cross-country analysis of the underlying growth drivers before and after the 2007-09 crises in 30 OECD countries. To explain the emergence of the different post-crises regimes, they consider

the requirements of deleveraging in the context of a financial boom-bust cycle, the role of fiscal policies and the relevance of price and non-price competitiveness for exports. They find that the former two drivers have had a major role to play, whereas differences and changes in international price competitiveness have been overrated in some of the previous CPE literature on macroeconomic regimes. Furthermore, they abandon the regime distinction, which has been developed for the pre-crisis period, and rather focus on the distinction of the different growth drivers for the clustering of countries in the post-crisis period. Jungmann (2021) has extended and applied the growth driver approach by Kohler and Stockhammer (2021) to a set of 19 emerging capitalist economies and has found mixed results.

Hein and Martschin (2021) have kept the typology for macroeconomic regimes in finance-dominated capitalism, based on the examination of growth contributions of demand aggregates and of sectoral financial balances. They link this approach with the post-Keynesian notion of macroeconomic policy regimes developed and applied in the early 2000s (i.e. Fritsche et al. 2005; Hein and Truger 2005a, 2005b, 2009; Herr and Kazandziska 2011). The concept of a 'macroeconomic policy regime' has been used to assess international and intertemporal comparative differences in macroeconomic performances of countries or regions. It describes the set of monetary, fiscal, and wage or income policies, as well as their coordination and interaction, against the institutional background of a specific economy, including the degree of openness or the exchange rate regime. This concept supposes that macroeconomic policies have not only short-run effects on economic performance, as in the NCM, but also long-run effects on output, income, employment, inflation, distribution and growth. These effects can be derived from post-Keynesian macroeconomic models generating and considering a full macroeconomic policy mix (i.e. Arestis 2013; Hein and Stockhammer 2010, 2011), as an alternative to the one implied by the orthodox NCM. Applying indicators for the stances of monetary and fiscal policies, for wage policies and income distribution, and for price and non-price competitiveness, Hein and Martschin (2021) have shown for the four largest Eurozone countries, France, Germany, Italy, and Spain, how the country-specific macroeconomic policy regimes have supported the shift (or non-shift) of macroeconomic regimes from the pre- to the post-crises period.

The following paper contributes to the literature on macroeconomic regimes in finance-dominated capitalism, focusing in particular on the factors that contributed to the regime shift after the 2007-09 crisis and the related change in the growth drivers. While the previous analysis has been mainly conceptual and empirical in nature, we will make use of a dynamic equilibrium stock-flow consistent (SFC) macroeconomic simulation model, in which any component of demand can assume the role of the growth driver, depending on the time specific structural and institutional conditions in the economy. This approach allows us to model the respective drivers of growth for the pre-crises macroeconomic regimes, as well as the imbalances and instabilities, which have built up within these regimes before the 2007-09 crises. Furthermore, we can model the key drivers of regime changes after the crises, which are related to the financial fragility built up in the pre-crisis period and the required deleveraging and credit restrictions in the course of the crises and after, to the

macroeconomic policy regime, i.e. the stances of fiscal policy and income distribution, as well as to the changes in international price and non-price competitiveness.

Our analysis proceeds as follows: In Section 2 we present the structure of our model and the behaviour of the different sectors. In Section 3, we conduct a series of simulation exercises to illustrate stylised versions of the pre-crisis DLPD and ELM regimes. In Section 4, we illustrate post-crisis transitions of these two regimes. Section 5 concludes.

2. The SFC simulation model

For the simulation, we make use of a stylised neo-Kaleckian SFC growth model. By adopting a SFC framework in the tradition of Godley and Lavoie (2007), we ensure that our model tracks sectoral financial flows and stocks.[2] The demand and growth regimes emerging from the model will be connected to different patterns of financial balances. For example, in the DLPD regime, the financial sustainability of indebted households will be in the focus, once their debt-to-income ratio exceeds a prudency threshold. This may then lead to constrained credit access and a disruption of the DLPD regime, with consequences for its trading partner, which will be a stylised ELM economy.

2.1 Aggregate output and income

We develop a two-country model, in which the two countries are linked via their trade relationship and the respective financial flows and emerging stocks. In the following, we only present the behavioural equations for the 'domestic' economy. The behavioural equations of the 'external' economy are defined in analogy to the domestic economy.

With constant prices in the goods market, for the domestic economy, aggregate real output, Y, is the sum of consumption, C, investment, I, government consumption, G, and net export demand, $X - M$.

$$Y = C + I + G + X - M \tag{1}$$

Since we assume constant labour productivity and fully elastic labour supply, with firms adjusting production to demand and with a constant price level, the model is fully demand-determined. Every component of aggregate demand in both countries is composed of an income-autonomous part and an income- or output-induced part, and can hence become a long-run driver of growth. From this it follows that no demand component will be marginalised, even if another demand component is the dominant driver of long-run growth.

The functional distribution of aggregate income between gross wages, W, and gross profits, P, is exogenously given by mark-up pricing, which in turn determines the aggregate

[2] Our approach is related to the SFC models by Belabed et. al (2017), Detzer (2018) and Kapeller and Schütz (2014), but clearly focuses on the change in growth drivers. The closed economy model in Kapeller and Schütz (2014) and the three country model in Belabed et al. (2017) do not address the changes in regimes in the course of and after the GFC and the GR. Detzer's (2018) model for an open economy touches upon this issue, but does not model the foreign economy.

wage share, ω. Government income is given by net taxes on wage and profit income, T, assuming a general net tax rate, τ.

$$Y = W + P \tag{2}$$

$$W = \omega Y \tag{3}$$

$$T = \tau Y \tag{4}$$

The balance sheet matrix of our 'domestic' economy in Table 1 displays the internal structure of assets and liabilities for the five sectors, which are the household sector ($_h$), the corporate sector ($_f$), the government sector ($_g$), the banking sector ($_b$) and the external sector ($_{RoW}$). The external sector is of course the 'external' economy and its own internal accounting structure is completely analogous to the one of the domestic economy.

Following a distinction introduced into Kaleckian models by Dutt (2016), the household sector is divided between top 10% income households, representing the fraction of households which earn manager salaries and distributed profits, and the bottom 90% of the income distribution, which have only marginal (and therefore neglectable) profit incomes.[3]

Deposits of each sector, D_i, held in the domestic banking system are the only financial asset for the non-bank domestic sectors. Firms hold the capital stock and are themselves–only implicitly–owned by top income capitalist and manager households. The only financial liability for the non-bank domestic sectors are bank loans. Financial claims and liabilities between the domestic and the external economy are captured by the net international investment position of the external sector, $NIIP_{RoW}$, which may be positive if the domestic economy is a (persistent) deficit country, or negative, if the domestic economy is a (persistent) surplus country. Clearance of deposits and domestic and international loans takes place through the domestic banking sector. Each sector may obtain loans from banks, L_i, in order to finance its expenditures if the sector is in deficit. Each sector receives interest payments on its financial assets or pays interests on its outstanding loans. There is only one global interest rate, r, which is set by the monetary authority (we abstract from a banking markup). For simplicity, we abstract from aggregate downpayment rates of domestic loans and international credit. Instead, each sector will repay loans when it switches from a deficit to a surplus position.

Table 1. Balance sheet matrix of domestic economy

	Households		***Firms***	***Government***	***Banks***	***RoW***	***Sum***
	Top 10% income	**Bottom 90% income**					
Deposits	$+D_{h1}$	$+D_{h2}$	$+D_f$	$+D_g$	$-D$		0
Loans	$-L_{h1}$	$-L_{h2}$	$-L_f$	$-L_g$	$+L$	$+NIIP_{RoW}$	0
Fixed capital			$+K$				$+K$
Net worth	$-V_{h1}$	$-V_{h2}$	$-V_f$	$-V_g$	$-V_b$	$-NIIP_{RoW}$	$-K$

[3] For differential saving propensities of these groups in the US, see recently Mian et al. (2021).

2.2 The household sector

Capitalist and manager households earn high net wages/salaries, W_{h1}, and receive distributed profits, P_d, from firms. In contrast, worker households receive low net wages, W_{h2}. We take the wage share of the top 10%, ω_{h1}, to be exogenous and determine the distribution of total net wage income between top 10% and bottom 90% households as follows:

$$W_{h1} = \omega_{h1}(1-\tau)W \tag{5}$$

$$W_{h2} = (1-\tau)W - W_{h1} = (1-\tau)(1-\omega_{h1})W \tag{6}$$

Disposable income of households is therefore given by the sum of their factor incomes and net interest payments/receipts on their net wealth:

$$Y_{d_{h1}} = W_{h1} + P_d + r_{-1}V_{h1_{-1}} \tag{7}$$

$$Y_{d_{h2}} = W_{h2} + r_{-1}V_{h2_{-1}} \tag{8}$$

Consumption of both household sectors is determined by autonomous consumption demand, $c_{a_{h1}}$, $c_{a_{h2}}$, by consumption from disposable income, with $c_{Y_{d_{h1}}}$ and $c_{Y_{d_{h2}}}$ denoting the respective propensities to spend out of income, and by wealth-based consumption from accumulated deposits, with the propensities $c_{V_{h1}}$, $c_{V_{h2}}$, respectively. Furthermore, the consumption function of the bottom 90% households contains a relative income effect which is proportional to the consumption of top 10% households. The parameter α can be seen as representing emulation-type behaviors in consumption decisions, a complex phenomenon affected by socio-cultural preferences, institutions, the (non-)provision of public goods (especially housing, education and healthcare), and access to credit. It may thus be viewed as an indicator for the necessity to 'keep up' in an increasingly unequal and competitive society, in which access to credit is easily provided. Changing financial norms and consumption emulation behaviour, including housing, are often linked to inequality and the rise in US household debt observed before the GFC and the GR (Barba and Pivetti 2009; Cynamon and Fazzari 2008; van Treeck 2014, 2015). In this sense, our consumption functions can also be interpreted as covering residential housing expenditures.

$$C_{h1} = c_{a_{h1}} + c_{Y_{d_{h1}}}Y_{d_{h1}} + c_{V_{h1}}D_{h1_{-1}} \tag{9}$$

$$C_{h2} = c_{a_{h2}} + c_{Y_{d_{h2}}}Y_{d_{h2}} + c_{V_{h2}}D_{h2_{-1}} + z\alpha C_{h1} \tag{10}$$

Aggregate consumption is the sum of top 10% and bottom 90% households' consumption:

$$C = C_{h1} + C_{h2} \tag{11}$$

The propensity to consume from disposable income is assumed to be higher for the bottom 90% households. Without the emulation effect, this means that redistribution in favor of top-income households would have negative effects on consumption demand. However, the relative income effect in the bottom 90% consumption function may mitigate negative distributional effects on consumption, and even over-compensate, generating what is called a 'seemingly profit-led' demand and growth regime (Kapeller and Schütz 2015; Hein and Prante 2020). If consumption emulation leads to increasing indebtedness, a rising debt-income ratio of bottom 90% households ($L_{h2}/Y_{d_{h2}}$) may exceed the acceptable ratio set by banks (l). Banks then stop lending to bottom 90% households, putting a brake on emulation-driven consumption and triggering an economic downturn. In our simulations below, this constitutes the end of an increasingly fragile DLPD regime.[4]

2.3 The firm sector

Firms' net profits, P_{net}, are given by total profits net of taxes and interest payments/receipts. Net profits are partially saved by firms as retained earnings, P_f, according to the retention rate, s_f, while the rest is distributed to top 10% households as distributed (net) profits, P_d.

$$P_{net} = (1-\tau)P - r_{-1}L_{f_{-1}} + r_{-1}D_{f_{-1}} \tag{12}$$

$$P_d = \begin{cases} P_{net} > 0: (1-s_f)P_{net} \\ \text{otherwise: } 0 \end{cases} \tag{13}$$

$$P_f = P_{net} - P_d \tag{14}$$

Firms' gross investment, I, into the capital stock, K, in excess of (accumulated) retained earnings can be financed with additional loans provided by the banking sector. We adopt a neo-Kaleckian investment function (Hein 2014, Chapter 6), in which firms' decisions about the rate of gross capital accumulation depends on animal spirits, the rate of economic activity and the capital scrapping rate.[5] The level of gross investment is determined by two terms: The first term, representing animal spirits and other non-output-induced determinants of investment (e.g. innovations, policy-determined investment by state-owned firms, etc.), is the product of the autonomous investment rate, a_a, and the previous period's capital stock, K_{-1}. The second term represents the output-induced component of investment, where a_Y is the propensity to invest and v is the exogenous capital-potential output ratio which is technologically-determined.

$$I = a_a K_{-1} + a_Y v Y \tag{15}$$

[4] The parameter z in the consumption function of bottom 90% households works as a switch parameter. When $L_{h2}/Y_{d_{h2}}$ exceeds l, z assumes the value of zero (one otherwise).

[5] Instead of using a post-Kaleckian Bhaduri-Marglin (1990) type of investment function, we deliberately rely on a neo-Kaleckian investment function which does not allow for profit-led growth through the investment channel. Our aim in the scenarios below is to show how, for principally wage-led economies, negative effects of redistribution have been overcompensated by other growth drivers.

The capital stock is affected by capital scrapping, with δ denoting the capital scrapping rate. The capital stock therefore develops according to the following equation:

$$K = K_{-1} + I - \delta K_{-1} \tag{16}$$

Full capacity output, is determined by the stock of capital and the technologically determined capital-potential output ratio, v:

$$u = \frac{Y}{Y_{fc}} \tag{17}$$

$$Y_{fc} = \frac{K_{-1}}{v} \tag{18}$$

2.4 The government sector

Focusing on the role of the government in determining aggregate demand and growth, we assume that the government finances its demand for goods and services, as well as its interest payments on outstanding loans, by net tax revenues, T, and by additional bank loans. Government consumption demand, G, is partially exogenous. We also include an induced component, where σ denotes the government's propensity to demand goods and services from tax revenue.

$$G = G_A + \sigma T \tag{19}$$

This simplistic 'fiscal policy rule' resembles the set-up in Brochier and Macedo e Silva (2019). As in their model, this implies a short-run pro-cyclical fiscal rule. However, different from Brochier and Macedo e Silva (2019), we allow for a growing trend of autonomous and deficit-financed government expenditures. Government expenditures may thus become a deficit-financed growth driver.

2.5 Trade and the external sector

For the illustration of the simultaneous emergence of the DLPD and the ELM regime, we do need both the domestic and the external economy to be endogenously affected by the developments in its counterpart. Therefore, we assume a two-country model in which the external economy is an exact structural replication of the domestic economy. This modelling choice also ensures that neither the external economy nor the domestic economy are marginalised in size over time when growth in the model is dominated by the growth of one of the domestic or external demand components.

The two economies are linked via the trade equations. For both economies, the import rate (the level of imports normalised by the capital stock) are determined by domestic demand, represented by the rate of utilisation, and by a price-competetiveness term, represented by the real exchange rate, e_r, where an increase in e_r implies a real depreciation of the domestic economy and has a negative effect on net exports, provided that the Marshall-Lerner condition holds. Following the trade equations in Rezai (2011) and von Arnim et al.

(2014), the levels of imports, exports and net exports from the perspective of the domestic economy are determined as follows:

$$M = (\phi u - \psi e_r)K_{-1} \tag{20}$$

$$X = \left(\phi_x u_x - \psi_x \frac{1}{e_r}\right) K_{x,-1} \tag{21}$$

$$NX = X - M \tag{22}$$

Note, that the exports of the domestic economy, X, are the imports of the external economy, which carries the index x in all its parameters and variables. Non-price competitiveness affects the parameters of the import equations of both economies. In our simulation exercises below, we will use these parameters to reflect stylised competitiveness shocks.

The trade balances together with international interest payments/receipts derived from the net international investment position define the current account for both economies. In the event of a current account deficit in the domestic economy, the external sector extends new credit to the domestic economy or repays outstanding credit previously extended by the domestic economy. In both cases, the domestic banking sector acts as a clearing system for international transactions.

2.6 The banking sector

The function of the domestic banking sector is to act as a simple clearing mechanism for the credit relations between the two countries. For example, if aggregate demand is persistently higher than aggregate income in the domestic economy, some of the non-bank sectors will start to demand loans from the banking sector, thereby balancing the external claims ($NIIP < 0$) against the domestic banking sector. As mentioned earlier, the banking sector may stop providing consumer credit to bottom 90% households when they have exceeded a certain debt-to-income ratio threshold. Since we do not allow for interest rate differentials, banks do not make any profits. The real interest rate, r, is set exogenously by an implicit central bank.

The financial balance of each sector is determined by the difference between income and expenditure flows and each sectors' net worth is the cumulation of past financial balances, except for firms, which also hold the capital stock. To ensure stock-flow consistency, the sectoral flows must sum to zero.

Table 2. Transaction-flow matrix of the domestic economy

	Households		*Firms*		*Government*	*Banks*	*RoW*	*Sum*
	Top 10% income	Bottom 90% income	Current	Capital				
Consumption	$-C_{h1}$	$-C_{h2}$	$+C$					0
Investment			$+I$	$-I$				0
Gvt. Expenditure			$+G$		$-G$			0
Exports			$+X$				$-X$	0
Imports			$-M$				$+M$	0
Wages	$+W_{h1_{gross}}$	$+W_{h2_{gross}}$	$-W$					0
Taxes	$-T_{w_{h1}}$	$-T_{w_{h2}}$	$-T_p$		$+T$			0
Profits	$+P_d$		$-P_{net}$	$+P_f$				0
Int. payments on loans	$-r_{-1}L_{h1_{-1}}$	$-r_{-1}L_{h2_{-1}}$	$-r_{-1}L_{f_{-1}}$		$-r_{-1}L_{g_{-1}}$	$+r_{-1}L_{-1}$	$+r_{-1}NIIP_{RoW_{-1}}$	0
Int. payments on deposits	$+r_{-1}D_{h1_{-1}}$	$+r_{-1}D_{h2_{-1}}$	$+r_{-1}D_{f_{-1}}$		$+r_{-1}D_{g_{-1}}$	$-r_{-1}D_{-1}$		0
Change in loans	$+\Delta L_{h1}$	$+\Delta L_{h2}$		$+\Delta L_f$	$+\Delta L_g$	$-\Delta L$	$-\Delta NIIP_{RoW_{-1}}$	0
Change in deposits	$-\Delta D_{h1}$	$-\Delta D_{h2}$		$-\Delta D_f$	$-\Delta D_g$	$+\Delta D$		0

Table 3 displays the balance sheet of the domestic and the external economy and shows the connection in the accounting structure of the two countries. Here we present the balance sheet matrix of the two-country model with consolidated non-banks for both economies with an additional column for the net international investment positions ($NIIP$). For stock-flow consistency at the global (i.e. two-country) level, total net worth must be equal to the overall capital stock.

Table 3. Global balance sheet matrix with consolidated non-bank sectors

	Domestic economy			***External economy***			
	Non-banks	***Banks***	***NIIP***	***NIIP***	***Banks***	***Non-banks***	***Sum***
Deposits	$+D$	$-D$			$-D_x$	$+D_x$	0
Loans	$-L_{nb}$	$+L$	$+NIIP$	$+NIIP_x$	$+L_x$	$-L_{nbx}$	0
Fixed capital	$+K$					$+K_x$	$K + K_x$
Net worth	$-V$	0	$-NIIP$	$-NIIP_x$	0	$-V_x$	$-(K + K_x)$

Note: $L = L_{nb} + NIIP$ and $V = V_{h1} + V_{h2} + V_g + V_b + V_{f_{fin}} + K + NIIP$, where $V_{f_{fin}}$ is firms' financial net worth.

3. The extreme regimes before the crisis and endogenously generated fragilities

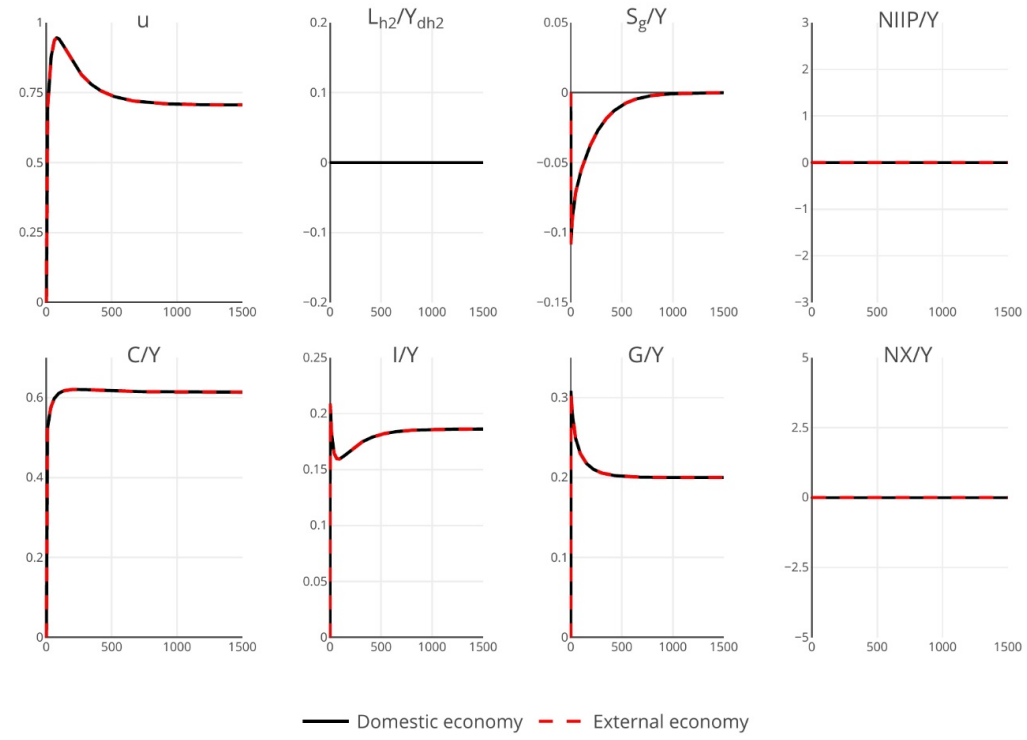
3.1 Simulation approach and baseline scenario

We now present a series of simulations that aim to provide stylised illustrations of some important characteristics of financialisation in the pre-crisis period: falling wage shares and rising inequality, less regulated and less prudent credit markets, the simultaneous emergence of DLPD and ELM regimes and the associated current account imbalances (Hein 2012). We then illustrate how these regimes may end up in a crisis and in a second step, we illustrate regime transitions in the post-crisis period.

For all scenarios, we assume an identical initial parameter constellation converging to the same steady-state baseline scenario. To derive the different demand and growth regimes, we impose a series of shocks to the steady-state baseline scenario. These shocks are related to the degree of financialisation in the pre-crisis period, the timing of the crisis itself and the post-crisis transition period. Details on numerical parameter values for basesline and shocks, as well as the exact timing of the shocks are presented in Table A1 and A2 in the appendix.

Figure 1 shows the convergence to the baseline steady-state with balanced current accounts, balanced government budgets, stable distribution, no emulation, and deficits only in the corporate sectors. Without emulation in the baseline, redistribution at the expense of the bottom 90% would have depressive effects on the domestic and the foreign economy, meaning that both economies show wage-led aggregate demand. The steady-state growth rate of output ($\hat{Y}$) in the baseline converges to 1.63%.

Figure 1: Convergence in the baseline scenario



3.2 The DLPD and the ELM regimes in the pre-crisis period

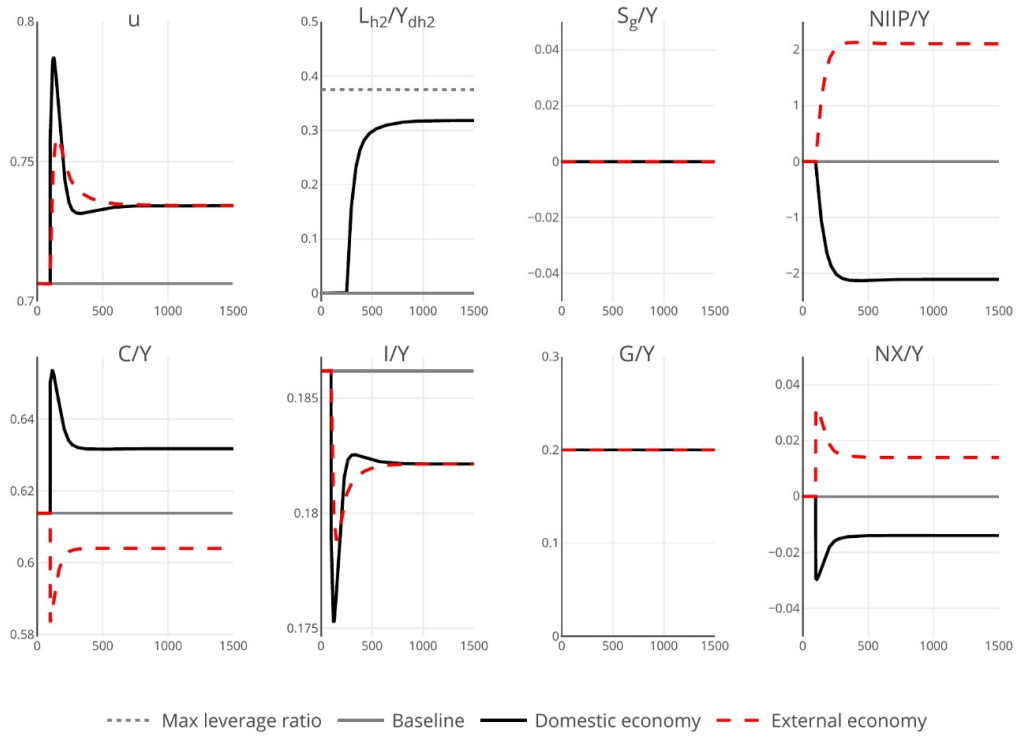
Our first set of shocks then generates a stylised DLPD and ELM regime in a pre-crisis financialisation phase. In the domestic economy, we combine a negative distributional shock to the aggregate wage share and a positive shock to the wage share of the top 10% households with a shock to expenditure and financial norms of households and banks by increasing the 'emulation' term (α). At the same time, domestic banks are easing their assessment of the acceptable debt-to-income ratio of households, implying less prudent credit markets. This reflects the strong liberalisation of the financial system in the era of financialistion witnessed in the period leading up to the financial crisis, especially in some prominent DLPD economies, like the US. In broad terms, this shock can be interpreted as a consolidated 'financial cycle shock' (Borio 2014; Guttmann 2016; Kapeller and Schütz 2014; Kohler and Stockhammer 2021; Palley 2011), which encompasses the initial phase of the financial cycle, in which more credit becomes available, but also an intermediate phase of the financial cycle, in which Minskyian banks (and households) are lowering their credit standards, due to the perceived stability of high (credit-dependent) growth and seemingly stable economic conditions. Due to rising inequality with easy access to credit and falling saving rates of bottom 90% households, the domestic economy turns to a DLPD regime.

For the external economy, we assume that the aggregate wage share falls while the wage share of top 10% households remains constant. This is in line with the more pronounced fall of the aggregate wage share associated with lower personal income inequality in

prominent ELM countries, like Germany.[6] In addition, we assume that redistribution at the expense of labour leads to a real depreciation of the external economy's currency. The external economy in our model thus turns to an ELM regime.

Figure 2 shows the adjustment to the initial shocks. In the domestic economy, the share of consumption in output rises. Top 10% households consume more due to the income gains and the bottom 90% households partially emulate the expenditures of the rich households, relying on credit finance and increasing their debt-to-income ratio. Capacity utilisation in the domestic economy rises and a negative current account and trade balances emerge. The steady-state growth rate increases to 1.67%.

Figure 2: The initial financialisation shock and the emergence of the DLPD regime and the ELM regime



In contrast to the DLPD regime, there is no increase in credit-financed consumption in the (now ELM) external economy which could offset the negative impulse triggered by redistribution.[7] Instead, the external economy needs to rely on the demand and growth impulse from the DLPD economy. As a consequence, the external economy's trade and current

[6] Germany is a prominent example of an export-led country in the pre-crisis period. However, the export-led regime also arose under other distributional conditions. In China, for example, both the labour income share dropped and personal inequality rose dramatically (Belabed et al. 2017).

[7] In countries like Germany, institutions, financing norms and more strictly regulated credit markets did not facilitate credit-financed consumption (Behringer and van Treeck 2019, Belabed et al. 2017, Detzer et al. 2017).

account turn positive and the net international investment position vis-à-vis the domestic economy rises.

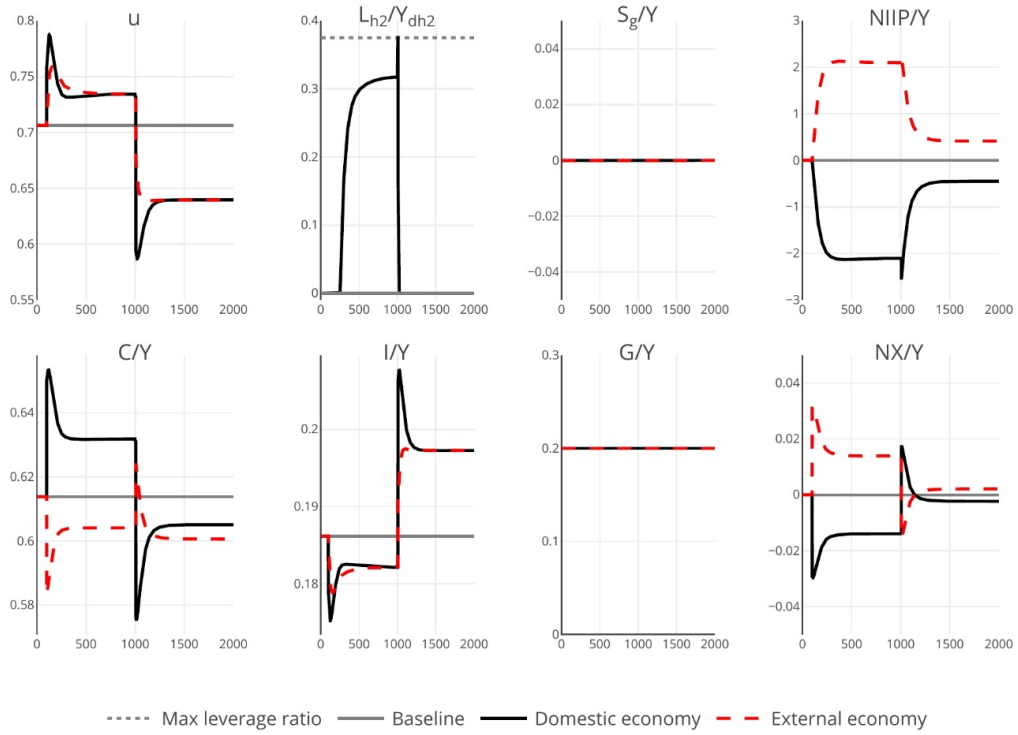
Overall, the financialisation-induced increase of domestic spending on consumption has increased utilisation in both economies and drives the growth rates of the system above the baseline growth rates. Credit-financed household expenditures in the DLPD economy and rising export demand in the external economy have therefore become the complementary growth drivers in the pre-crisis phase.

3.3 The crisis

In our simulation, the stylised measure of 'financial fragility' is the margin between the debt-to-income ratio of households and banks' acceptable ratio, l. In the course of the emergence of DLPD and ELM regimes, financial fragility in the system has strongly increased. By now, a minimal expansion of the credit-to-income ratio of domestic bottom 90% households can drive the economy into crisis. An additional sequence of marginal distributional shocks to the detriment of the bottom 90% households in the domestic economy (falling ω and rising ω_{h1}) now causes the debt ratio of bottom 90% households to increase further and to eventually exceed the acceptable ratio of banks, which triggers an abrupt end to credit access plunging the hitherto stable system into crisis (Figure 3). Domestic bottom 90% households can no longer sustain their credit-financed consumption expenditures relative to top 10% households, leading to a sharp decline in capacity utilisation and abrupt deleveraging. As a result of the crisis, the financial cycle ends. Here, we assume that the acceptable debt-to-income ratio of banks and the emulation parameter of households both fall to zero, because banks and households become much more prudent.[8] Temporarily, the growth rate of output falls to negative territory and then converges to a lower positive level.

[8] Without this 'prudence shock', banks would allow credit access after the debt-to-income ratio drops below their threshold. This would create periodic boom-bust cycles in the model. By setting it to zero, we aim to illustrate a structural shift where the severity of the crisis led to a prolonged credit supply shock and precautionary saving, similar to the situation after the the GFC and the GR. Of course, credit access and relative income effects could also partially or fully resume after a while, which would also allow for dampened periodic boom-bust cycles in the model. See Kapeller and Schütz (2014) for an elaborate theory of Minsky–Veblen cycles in a closed economy SFC model.

Figure 3: The debt-to-income ratio and utilisation – a small additional distributional shock can bring the system to crisis



The crisis in the DLPD regime also causes a global decline in growth, exceeding in magnitude the positive growth impulse from the initial financialisation shock. Declining domestic demand also leads to declining import demand relative to the external economy's demand for domestic goods and thus to an upwards correction in the current account and trade balances and in international indebtedness.

With the disappearance of credit-financed consumption as a driver of growth, the depressing effects of higher inequality become apparent in both economies. Falling rates of capacity utilisation and a lower steady-state growth rate ($\hat{Y}$=1.52%) indicate the resulting stagnation tendency.

4. The regimes emerging in the course of the crisis and after and the drivers of regime change

4.1 Regime changes and their drivers: deleveraging, fiscal policies, income distribution and open economy conditions

As pointed out in the introduction, some authors have examined the shift of regimes in the course of the 2007-09 crises. Focusing on developed capitalist economies, they have found that some of the DLPD countries have turned DDL stabilised by government deficits, whereas others have become ELM, and that some major ELM countries have maintained their regime.[9]

[9] For demand and growth regimes in emerging capitalist economies, the change in regimes and respective growth drivers, see Akcay et al. (2021) and Jungmann (2021), for example.

Hein (2019) and Hein and Martschin (2020) have argued that the main drivers behind these regime changes have been the requirements to deleverage in the private household sectors and the ability and willingness to make use of compensatory deficit-financed fiscal policies. Hein et al. (2021) argue that changes in the welfare models and related changes in income distribution have also played a role, and Hein and Martschin (2021) insist that the whole macroeconomic policy mix, including monetary, fiscal and wage/incomes policies, as well as open economy conditions, i.e. openness, price and non-price competitiveness, should be considered in order to explain the changes in regimes. Kohler and Stockhammer (2021) have abandoned the regime classification for the post-crisis period and focused instead on growth drivers, concluding that the post-crisis growth performance can be explained by the downswing of the financial cycle, i.e. the required deleveraging of the private household sector, and by fiscal policies. Regarding international competitiveness they claim that it is non-price competitiveness which matters for growth, not price competitiveness.

In order to simulate the transition to the post crises regimes, we can now include several factors on which the above-mentioned literature has focused: the required deleveraging of private households related to pre-crises indebtedness and changing prudential standards of the banking sector, fiscal policy responses, changes in functional and personal income distribution, changes in international price competitiveness related to changes in income distribution, as well as non-price competitiveness.

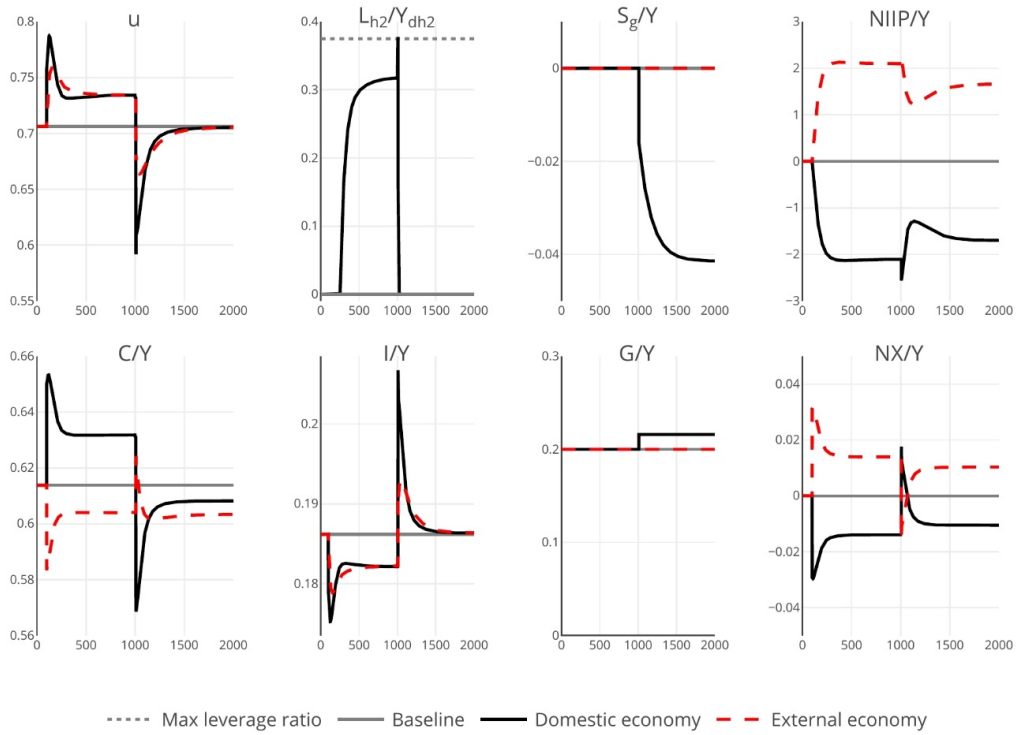
4.2 From DLPD to DDL stabilised by government deficit expenditures

To generate a change from the DLPD to the DDL regime stabilised by deficit-financed government expenditures, we assume that in the domestic economy, after the crisis and the deleveraging of bottom 90% households, banks and households remain precautionary and prudent, and that both the emulation parameter and banks' accepted debt-to-income ratio remain at zero. A positive fiscal policy shock is employed to generate the regime shift from DLPD to DDL in the domestic economy.[10]

In our policy shock scenario, fiscal policy in the domestic economy assumes a more expansionary role in response to the crisis. We model this as an increase in the propensity to spend out of tax income, meaning that the parameter σ in equation (19) rises above one. This implies that the government is persistently running fiscal deficits.

[10] Monetary policy is not considered. In our simplified modelling framework, we assume only one global interest rate which only affects demand through consumption of households via disposable income. An interest rate shock in such a setting can easily have counterintuitive, and hence 'puzzling' macroeconomic effects (Lavoie 1995). After the crisis, both the domestic and the external consolidated household sectors are net creditors with positive interest income. A fall in the interest rate would therefore imply a redistribution of income away from households to firms, which have a much lower average propensity to spend and whose expenditure decisions are also not constrained by interest outlays in our framework.

Figure 4: DLPD to DDL – relying on fiscal deficits



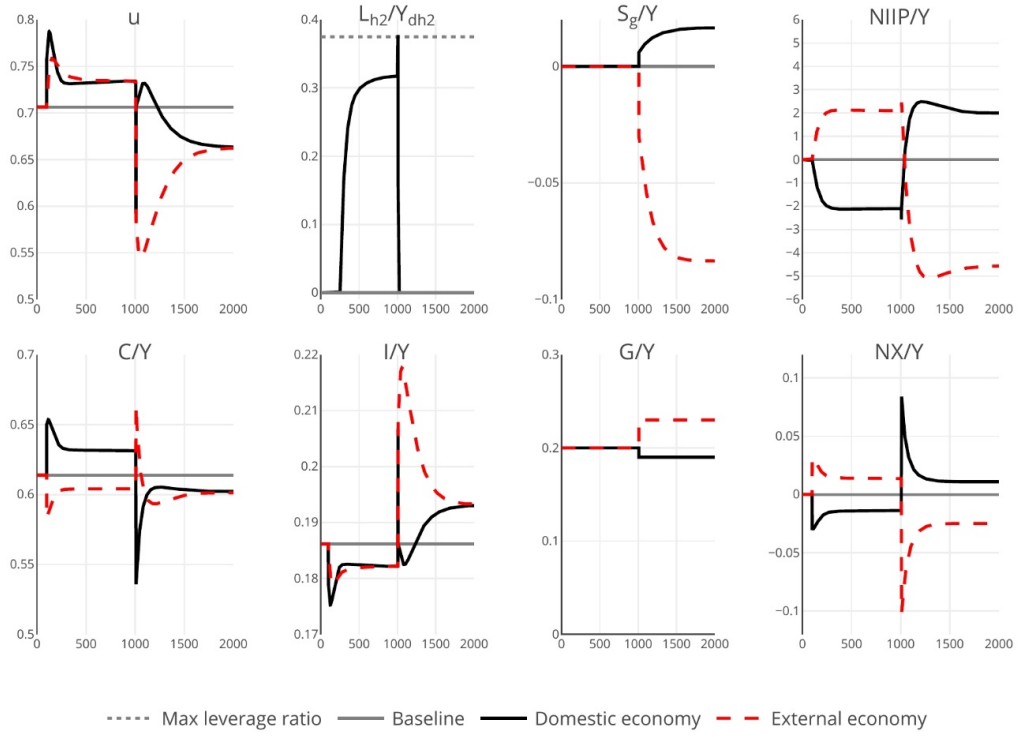
The expansionary fiscal policy shock generates a strong rebound of the rate of capacity utilisation and steady-state growth ($\hat{Y}$=1.63%) after the crisis (Figure 4). However, the increase in domestic demand also leads to a renewed expansion of the trade and current account imbalances, as we have assumed that the counterpart ELM foreign economy does not responded to the crisis with expansionary policies.

4.3 From DLPD to ELM

After the crisis, some DLPD countries moved towards an ELM regime, in particular in the Eurozone, mainly because of the constraints imposed on deficit financed fiscal policies. In such a scenario, domestic demand gets constrained by restrictive fiscal policy. We replace the shock from the previous section with a negative shock to the domestic governments' propensity to spend out of tax income, implying an austere fiscal policy regime. Domestic demand is also further constrained by another worsening of the income distribution with respect to bottom 90% households, which we model with an additional small negative shock to the aggregate wage share and a small positive shock to the wage share of top 10% households. As in the pre-crisis ELM regime, this distributional shock is paralleled with an improvement in price and non-price competitiveness. Finally, for a transition of the DLPD to an ELM regime, we need to assume that the external economy, a pre-crisis ELM country, now becomes a DDL economy driven by government deficit expenditures (σ_x rises above one). Figure 5 presents this scenario. The signs of the trade and current accounts switch for both economies. Different

from all previous scenarios, the external economy now assumes the role of the driver of (low) growth ($\hat{Y}$=1.56%) imposing on the model the tendency toward stagnation as expected in this type of regime transition (Hein 2019, 2022).

Figure 5: DLPD to ELM – relying on external demand



5. Conclusions

In an attempt to contribute to the recent debate on growth models in the post-Keynesian and CPE literature, we have outlined and simulated a basic post-Keynesian two country SFC model to demonstrate the interconnection of three of the main features/outcomes of finance-dominated capitalism, namely worsening income distribution for the bottom 90% households, the rise of international imbalances and the build-up of financial fragility. In the model, the baseline simulation has wage-led features. Shocking the model by changing distribution and introducing emulation in consumption, two basic regimes emerge, depending on the institutional setting of the respective model economy, the DLPD and the ELM regime. We have demonstrated the complementarity and interdependence of these two regimes. Furthermore, we have shown how this constellation after the crisis transformed into the DDL regime stabilised by government deficits, on the one hand, and the ELM regimes, on the other, depending on required deleveraging of private household debt, distributional developments and fiscal policy. Of course, modelling the interconnection of the features of finance-dominated capitalism, as well as the complementarities and interdependencies of the pre- and post- 2007-09 crisis regimes, some drastic simplifications had to be made to keep the model concise. For example, we have not modelled asset prices and housing demand has been

treated as part of household consumption. The financial cycle has thus been included in a very rudimentary way. And, as it is often the case in SFC simulations models, we have to admit that simulation results are quite sensitive to the chosen parameter values. Nonetheless, we hope that this simple two country model contributes to the understanding of the interconnectedness of the features of finance-dominated capitalism and the varieties, complementarities and interdependencies of the related demand and growth regimes.

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Appendix

A1. Extended list of model equations

Output domestic economy

$$Y = C + I + G + X - M$$

Income domestic economy

$$W = \omega Y$$
$$P = Y - W$$
$$T = \tau Y$$
$$T_{W_{h1}} = \tau W \omega_{h1}$$
$$T_{W_{h2}} = \tau W - T_{W_{h1}}$$
$$W_{h1_{gross}} = \omega_{h1} W$$
$$W_{h2_{gross}} = W - W_{h1_{gross}}$$
$$W_{h1} = (1-\tau) W \omega_{h1}$$
$$W_{h2} = (1-\tau) W - W_{h1}$$
$$T_P = \tau P$$
$$P_{\text{net}} = (1-\tau) P - r_{-1} L_{f_{-1}} + r_{-1} D_{f_{-1}}$$
$$P_d = \begin{cases} P_{net} > 0 \colon \left(1 - s_f\right) P_{net} \\ \text{otherwise: } 0 \end{cases}$$
$$Y_{d_{h1}} = W_{h1} + P_d + r_{-1} V_{h1_{-1}}$$
$$Y_{d_{h2}} = W_{h2} + r_{-1} V_{h2_{-1}}$$
$$P_f = P_{net} - P_d$$

Households domestic economy

$$C = C_{h1} + C_{h2}$$
$$c_{a_{h1}} = c_{a_{h1_{-1}}} \left(1 + \widehat{c_{a_{h1}}}\right)$$
$$C_{h1} = c_{a_{h1}} + c_{Y_{d_{h1}}} Y_{d_{h1}} + c_{D_{h1}} D_{h1_{-1}}$$
$$z = \begin{cases} \dfrac{L_{h2}}{Y_{d_{h2}}} < l \colon 1 \\ \text{otherwise: } 0 \end{cases}$$
$$c_{a_{h2}} = c_{a_{h2_{-1}}} \left(1 + \widehat{c_{a_{h2}}}\right)$$
$$C_{h2} = c_{a_{h2}} + c_{Y_{d_{h2}}} Y_{d_{h2}} + c_{D_{h2}} D_{h2_{-1}} + z\alpha C_{h1}$$
$$S_{h1} = Y_{d_{h1}} - C_{h1}$$
$$S_{h2} = Y_{d_{h2}} - C_{h2}$$
$$V_{h1} = V_{h1_{-1}} + S_{h1}$$
$$D_{h_1} = \begin{cases} V_{h1} > 0 \colon V_{h1} \\ \text{otherwise: } 0 \end{cases}$$
$$L_{h_1} = \begin{cases} V_{h1} < 0 \colon -V_{h1} \\ \text{otherwise: } 0 \end{cases}$$
$$V_{h2} = V_{h2_{-1}} + S_{h2}$$
$$D_{h_2} = \begin{cases} V_{h2} > 0 \colon V_{h2} \\ \text{otherwise: } 0 \end{cases}$$

$$L_{h_2} = \begin{cases} V_{h2} < 0: -V_{h2} \\ \text{otherwise: } 0 \end{cases}$$

Firms domestic economy

$$I = a_a K_{-1} + a_Y v Y$$
$$S_f = P_f - I$$
$$K = K_{-1} - \delta K_{-1} + I$$
$$u = Y / Y_{fc}$$
$$Y_{fc} = K_{-1} / v$$
$$V_{f_{fin}} = V_{f_{fin_{-1}}} + S_f$$
$$D_f = \begin{cases} V_{f_{fin}} > 0: V_{f_{fin}} \\ \text{otherwise: } 0 \end{cases}$$

$$L_f = \begin{cases} V_{f_{fin}} < 0: -V_{f_{fin}} \\ \text{otherwise: } 0 \end{cases}$$

$$V_f = V_{f_{fin}} + K$$

Government domestic economy

$$G_A = G_{A_{-1}}\left(1 + \widehat{G_A}\right)$$
$$G = G_A + \sigma T$$
$$S_g = T - G + r_{-1} V_{g_{-1}}$$
$$V_g = V_{g_{-1}} + S_g$$
$$D_g = \begin{cases} V_g > 0: V_g \\ \text{otherwise: } 0 \end{cases}$$
$$L_g = \begin{cases} V_g < 0: -V_g \\ \text{otherwise: } 0 \end{cases}$$

Trade current account and NIIP domestic economy

$$M = (\phi u - \psi e_r) K_{-1}$$
$$X = (\phi^x u^x - \psi^x / e_r) K_{-1}^x$$
$$NX = X - M$$
$$CA = NX + r_{-1} NIIP_{-1}$$
$$R_{CA} = r_{-1} NIIP_{-1}$$
$$NIIP = NIIP_{-1} + CA$$

Banks domestic economy

$$L = L_{h1} + L_{h2} + L_f + L_g + NIIP$$
$$R_L = r_{-1} L_{-1}$$
$$D = D_{h1} + D_{h2} + D_f + D_g$$
$$R_D = r_{-1} D_{-1}$$
$$R = R_L - R_D$$
$$V_b = L - D$$

A2. Baseline parameter constellation and shock sequences for scenarios

Table A1. Baseline parameter constellation

Parameter	*Description*	*Baseline for the domestic and external economy*
a_a	Autonomous rate of investment	0.015
a_Y	Propensity to invest	0.016
$c_{a_{h1}}$ *in t = 0*	Autonomous consumption h_1	0.2
$\widehat{c_{a_{h1}}}$	Growth of $c_{a_{h1}}$	0
$c_{a_{h2}}$ *in t = 0*	Autonomous consumption h_2	0.2
$\widehat{c_{a_{h2}}}$	Growth of $c_{a_{h2}}$	0
$c_{V_{h1}}$	Propensity to consume out of wealth h_1	0.05
$c_{V_{h2}}$	Propensity to consume out of wealth h_2	0.015
$c_{Y_{d_{h1}}}$	Prop. to consume out of disposable income h_1	0.4
$c_{Y_{d_{h2}}}$	Prop. to consume from disposable income h_2	0.7
G_A *in t = 0*	Autonomous government demand	0.5
$\widehat{G_A}$	Growth of G_A	0.01
K *in t = 0*	Fixed capital stock	40
l	Banks' maximum acceptable leverage ratio for h_2	0
s_f	Firms' retention rate	0.3
V_f *in t = 0*	Firms net worth	40
v	Capital-potential output ratio	5
α	Consumption emulation parameter	0
δ	Capital scrapping rate	0.01
σ	Prop. to spend out of tax income	1
τ	General net tax rate	0.2
ϕ	Demand effect on imports	0.05
ψ	Price-competetiveness effect on imports	0.01
ω	Aggregate wage share	0.6
ω_{h1}	Wage share of h_1 households	0.2
		Global
e_r	Real exchange rate	1
r	Real interest rate	0.01

Table A2. Shock sequences for scenarios

Description of shock and timing	*Parameter*	*Domestic economy*	*External economy*
(1) 'Pre-crisis financialisation' (t = 100)	l	0.375	
	α	0.29	
	ω	0.55	0.5
	ω_{h1}	0.3	
	e_r	0.9	
(2) Small additional distributional change (t = 1000)	ω	0.545	
	ω_{h1}	0.305	
(3) Within crisis 'prudence' shocks (t = 1009)	l	0	
	α	0	
(4) Post-crisis fiscal deficits in domestic economy (t = 1010)	σ	1.08	
(5) DLPD to ELM (t = 1031)	σ	0.97	1.15
	ϕ	0.04	0.06
	ψ	0.015	
	ω	0.5	
	ω_{h1}	0.25	
	e_r	1	

Notes:

The table reports only the values of the shocked parameters. Other values remain as in the baseline.
Shock timing: t = 0 is the last period of the convergence phase of the baseline.
Combination of shock sequences from table for each scenario:

1. Pre-crisis debt-led and export-led growth (Figure 2): (1)
2. Pre-crisis debt-led and export-led growth with crisis (Figure 3): (1) + (2) + (3)
3. Post-crisis fiscal deficits in domestic economy (Figure 4): (1) + (2) + (3) + (4)
4. DLPD to ELM (Figure 5): (1) + (2) + (3) + (5)

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