Government policies and financial crises: mitigation, postponement or prevention?

Jakob Kapeller, Michael A. Landesmann, Franz X. Mohr and Bernhard Schütz*

In the aftermath of the Great Recession, governments have implemented several policy measures to counteract the collapse of the financial sector and the downswing of the real sector. Within a framework of Minsky–Veblen cycles, where relative consumption concerns, a debt-led growth regime and financial sector confidence constitute the main causes of economic fluctuations, we use computer simulations to assess the effectiveness of such measures. We find that the considered policy measures help mitigate the impact of financial crises, though they do so at the cost of shortening the time between financial crises. This result is due to a relatively fast recovery of solvency and confidence induced by the policy measures under study which contribute to an increase in private credit and, thereby, effective demand. Our results suggest that without the strengthening of financial regulation, any policy intervention remains incomplete.

1. Introduction

In the run-up to the Great Recession, a prominent group of countries—among them the USA, the UK and several EU-countries—experienced economic growth based on rising private debt. These 'debt-led growth models' (Stockhammer, 2015) showed quite different structural characteristics. In the case of the European Union (Portugal, Greece, Spain), the crisis has been explained mainly with reference to declining international competitiveness and unsustainable expenditures on consumption and residential investment caused by ongoing capital inflows (see e.g. Shambough, 2012; Storm and Naastepad, 2015; Stockhammer, 2015). In the case of the two major Anglo-Saxon countries (and also in Ireland), the focus has been on rising inequality as well as institutional changes in the financial sector that had occurred over the previous decades. According to this account, deregulation of financial markets and financial innovation allowed for increased risk-taking behaviour by financial actors, which caused an unsustainable rise in private debt conjoint with corresponding asset bubbles.[1] The more

[1] See, e.g. Konzelmann *et al.* (2012).

recent interpretations of these developments closely resemble the arguments put forth by Hyman Minsky (1986):[2] After a period of relative stability, actors in the financial sector and governmental supervisory bodies gradually became less sensitive to the potential uncertainty and destructive dynamics associated with an increasingly complex and ever more leveraged financial system. Backed by the booming housing market, the new financial instruments that emerged in this phase initiated a positive feedback loop, which led to rising leverage ratios and increasing demand for high-yielding assets. The fragility inherent in such loops became obvious as soon as expectations turned around: when the housing bubble burst, actors started to deleverage, asset prices fell and a significant part of the financial sector was threatened with bankruptcy. International contagion effects led to the transmission of financial fragility to Europe, where particularly the peripheral countries with relatively high debt positions suffered from dramatic real economy repercussions.[3] The link between private credit booms and financial crises has recently also been confirmed by Schularick and Taylor (2012), who find that the former are an excellent predictor of the latter.

With respect to the USA, the recent literature has put a lot of emphasis on the role of income inequality and consumer aspirations.[4] This line of argument follows the narrative about relative consumption concerns as introduced by Thorstein Veblen ([1899] 1970):[5] As the incomes of many families stagnated and fell behind those of their reference groups (neighbours, family members, media images), efforts to 'keep up with the Joneses' led to falling saving rates and rising credit demand, which was willingly satisfied by a 'bubbling' financial sector in the 2000s.

Empirical evidence for the causal effect of inequality on credit growth is provided in Christen and Morgan (2005) for the recent US experience. Furthermore, a number of other studies have produced empirical evidence pointing to the relevance of relative consumption concerns.[6] Although debt and inequality have been rising simultaneously in many countries, all these studies have focused on the USA. Two recent studies investigate this phenomenon within a global context: Using a multi-country panel, Bordo and Meissner (2012) do not find a statistically significant relationship between inequality and credit. However, Gu and Huang (2014) show that once one takes into account the possibility of heterogeneous impacts across countries ('random effects model'), inequality does have a significant positive influence on credit growth in this international context.

The relationship between inequality, debt and economic fluctuations is a distinctive feature of a *Minsky–Veblen cycle*, as formulated by Kapeller and Schütz (2014). In such a cycle, growing inequality amplifies relative consumption concerns, which leads to a fall in saving rates and rising demand for credit. Following periods of relative financial stability, banks become increasingly willing to provide these loans, which causes a consumption boom. As private indebtedness increases and households reduce spending

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[2] See on this, e.g. McCulley (2009) and Whalen (2007).
[3] See on this also Stockhammer (2015).
[4] See Barba and Pivetti (2009), Cynamon and Fazzari (2008, 2013), Evans (2009), Frank (2007), Hein (2011), ILO and IMF (2010), Kumhof and Rancière (2010), Kumhof *et al.* (2012), Rajan (2010), Reich (2011), Stiglitz (2009), Stockhammer (2012, 2015), UN Commission of Experts (2009), van Treeck (2014), Weller (2007), Wisman (2009, 2013) and Wolff (2010).
[5] See also Duesenberry ([1949] 1962), who developed a consumer theory with similar implications.
[6] See Boushey and Weller (2006), Bowles and Park (2005), Krueger and Perri (2006), Neumark and Postlewaite (1998), Pollin (1988, 1990) and Schor (1998).

in order to serve debt payments, demand decreases, income stops rising, households become insolvent and the economy experiences a financial crisis. Along with a period of bankruptcies, households and financial actors aim for a consolidation of their balance sheets, which leads to a period of low growth. As debt gets reduced ('deleveraging'), the financial sector regains confidence, financial innovations pick up again and regulators may be convinced that this time is different. Eventually, this will give rise to another Minsky–Veblen cycle. The claim that this chain of events can repeat itself is not very far-fetched: Also, the Great Depression was preceded by (1) a period of rising inequality,[7] (2) rapid growth of an innovative financial sector which enabled household debt to increase, and (3) a period in which consumer durables had become the dominant driver of economic growth (Brown, 1997; Livingston, 2009; Wisman, 2014; Wisman and Baker 2010).

Minsky–Veblen cycles are characterised by a specific type of debt-led growth episodes that have been observed recently. For example, the US economy appears to find itself in the aftermath of such a cycle. After a series of emergency policies, including financial sector bailouts, fiscal stimuli and changes in legislature, employment has been recovering in the recent past, though the sustainability of this recovery is still subject to controversial debate. European policymakers have reacted differently to the crisis. They follow a much more restrictive fiscal policy stance, being late both with the use of 'unorthodox' monetary policy measures like quantitative easing as well as in bank restructuring and bank consolidation. The result is a prolonged period of stagnation for the larger part of the continent with virulent economic crises in Europe's periphery. It therefore remains an important question what economic policy can do in the aftermath of such a financial crisis to mitigate the immediate consequences and to prevent future crises. In order to deal with this question, we proceed as follows: Section 2 discusses economic policy measures undertaken following the onset of the financial crisis in 2007. Section 3 examines these measures by building on a theoretical framework initially proposed by Kapeller and Schütz (2014). The final section contains concluding remarks.

2. The Great Recession and government policies: an overview

This section provides a broad overview on policy measures implemented in the aftermath of 2007. Passed in October 2008, the *Troubled Asset Relief Program* (TARP) was the first public measure introduced to counteract the immediate consequences of the financial crisis in the USA. Initially, Congress authorized a $700 billion program to stabilize the financial sector through the purchase and insurance of troubled assets as well as the direct purchase of equity of financial institutions themselves. The size of the program was later reduced to $475 billion. Further funds were used to stabilize the automotive industry through equity purchases and to support struggling families in avoiding foreclosure through loan modifications that reduce monthly payments to affordable levels (see Table 1).[8]

According to the IMF (2011), the total disbursements for bailing out banks until March 2011 amounted to 5.2% of US GDP (of which 1.8% could be recovered until

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[7] See also Piketty (2014).
[8] See US Department of the Treasury (2015).

that date). See Table 2 for a comparison of selected countries. In September 2016, total TARP obligations are reported at \$457 billion, where \$434 billion have been actually disbursed. Total funds recouped in the meantime amount to \$442 billion (US Department of the Treasury, 2016).[9]

Following financial sector bailouts, in 2009 the US government passed the *American Recovery and Reinvestment Act* (ARRA) as a fiscal stimulus package accounting for a total of \$787 billion (5.5% of US GDP). It consisted of personal transfers, tax cuts, transfers to state and local governments as well as infrastructure expenditures (see Table 3).

These two major packages differed with respect to their main purposes. While TARP was mainly aimed at stabilizing the financial sector, ARRA was intended to bring the economy out of a deep recession and reduce unemployment. Any assessment of their impact therefore depends on how they succeeded in achieving these distinct goals. Such an analysis is complicated by the problem that it is difficult to evaluate these programs in isolation from other policy measures, such as interest rate changes and the introduction of unconventional policies by the Federal Reserve. Keeping this limitation in mind, it has become the general perception that TARP did help stabilize the financial sector (see, e.g. Mishkin, 2011; Swagel, 2015).

Table 1. *Composition of the Troubled Asset Relief Program (TARP)*

	Denoted amount (in billion)	Share of total
Stabilization of banking institutions	\$250	53%
Restarting credit markets	\$27	6%
Stabilization AIG	\$70	15%
Stabilization car industry	\$82	17%
Helping struggling families to avoid foreclosure	\$46	10%

Source: US Department of the Treasury (2015).

Table 2. *Costs for bailing out banks in % of GDP in selected countries*

	Direct support	Recovery	Net direct cost
Belgium	4.3	0.2	4.1
Ireland	30.0	1.3	28.7
Germany	10.8	0.1	10.7
Greece	5.1	0.1	5.0
Netherlands	14.4	8.4	6.0
Spain	2.9	0.9	2.0
UK	7.1	1.1	6.0
USA	5.2	1.8	3.4
Average	6.4	1.6	4.8
In billions of US dollars	1,528	379	1,149

Source: IMF (2011, 8).

[9] Considering the substantial amount of recollected disbursements, the US government's strategy seems to have been fairly successful in contrast to, e.g. similar measures undertaken in the UK (see Culpepper and Reinke, 2014).

Table 3. *Components of the 2009 ARRA stimulus program*

	Funding committed (in billions)	Percentage of total funding
Transfers to persons	**$271**	**34.7%**
Unemployment insurance	$224	28.6%
Tax cuts	**$190**	**24.3%**
Higher income tax cuts	$72	9.2%
Lower and middle-income tax cuts	$64	8.2%
Business and other tax incentives	$40	5.1%
Transfers to state and local governments	**$174**	**22.2%**
Divided equally between Medicaid and education		
Infrastructure and other direct spending	**$147**	**18.8%**
Non-traditional infrastructure, including green economy	$109	13.9%
Traditional infrastructure	$38	4.9%

Source: Pollin (2012, 173); based on data from Blinder and Zandi (2010).

The fact that it took a while for the US unemployment rate to come close to pre-2007 levels[10] has led several scholars to question the impact of ARRA. Taylor (2011) argues that, similar to two other fiscal spending initiatives in the 2000s, it was ineffective, because households as well as states and local governments largely saved the granted transfers and tax rebates. Aizenman and Pasricha (2013) point out that when looking at consolidated fiscal expenditures, the stimulus was close to zero, since state and local governments reduced their expenditures by about the same amount as the expansion put into effect by the federal government. According to their study, if only consolidated fiscal expenditure is taken into account, the US fiscal stimulus ranks among the lower third of OECD countries, which have implemented similar measures.

Pollin (2012) concludes from a review of the evidence and the related empirical literature on fiscal multipliers, that ARRA relied too heavily on tax cuts (24%; see Table 3) and too little on direct spending initiatives, which have considerably higher fiscal multipliers.[11] Concerning the quantitative importance of transfers to households and local governments, he emphasizes that although they did not produce additional net spending, they secured a floor to a potential further fall in aggregate demand and thereby prevented the latter from collapsing. The latter point is confirmed by Chodorow-Reich *et al.* (2012) and Wilson (2012), where the former find that transfers to state governments—almost all of which have balanced budget requirements—had substantial employment effects and the latter estimates that ARRA saved about 2.1 million jobs (1.6% of pre-ARRA total nonfarm employment).

Support for this conjecture comes from the European experience, where a much more hesitant government response to the crisis led to a double-dip recession and a much more prolonged period of deleveraging than in the USA. Between 2009Q1–2010Q1, annual growth of consolidated fiscal spending was already negative in Greece (–14%),

[10] In August 2016 it stood at 4.9% (June 2006: 4.6%), while at its peak it had been at 10% in 2009 (Bureau of Labor Statistics, 2016).

[11] See the Congressional Budget Office (2011) for a possible range of multipliers across different types of spending.

Iceland (–7.9%), Ireland (–3.4%), Poland (–1.3%), Austria (–1.2%) and Italy (–0.95%) (Aizenman and Pasricha, 2013). While during that period other European economies increased fiscal spending, almost all European countries started to focus on reducing their deficits under the impression of the rise in public debt levels (partly due to financial sector bailouts).[12] At the beginning of 2016, unemployment in the European Union stood at 8.8%, compared to 4.9% in the USA.[13]

3. Government policies within a Minsky–Veblen cycle: breaking the cycle vs. bolstering its impact

The policies discussed in the previous section were directed at preventing the financial system from collapsing (TARP) and ending the recession (ARRA). From a Minskyan perspective, this means that these measures were directed at mitigating the consequences of the crisis, without addressing the need to prevent the occurrence of a next. However, if the regulatory environment does not change, the next boom-bust cycle is likely to begin once investor confidence and bank balance sheets have recovered sufficiently. Therefore, without substantial institutional changes including tighter and more effective regulatory measures, these governmental policies contribute to a boom-bust-bailout-boom cycle, as sketched by Crotty (2009, 563): '[The] evolution [of the financial sector] has taken the form of cycles in which deregulation accompanied by rapid financial innovation stimulates powerful financial booms that end in crises. Governments respond to crises with bailouts that allow new expansions to begin. As a result, financial markets have become ever larger and financial crises have become more threatening to society, which forces governments to enact ever larger bailouts.'

This claim can be illustrated by a simple model: We build on the theoretical model initially developed by Kapeller and Schütz (2014) and add a government sector.[14] For a full representation of the model, including a complete list of equations, see the online appendix.[15] In order to capture the core properties of Minsky–Veblen cycles, we assume that households can be divided into three groups: two groups of worker households and the capitalist households representing the sole owners of firms and banks. In each period, aggregate output (Y) is equal to the sum of consumption demand by worker households of type 1 (C_1), type 2 (C_2) and capitalist households (C_c), as well as realised investment (I) and government expenditure (G):

$$Y_t = C_{1,t} + C_{2,t} + C_{c,t} + I_t + G_t \qquad (1)$$

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[12] See on this also Kitson *et al.* (2011).

[13] OECD labour market statistics for Q1 2016.

[14] The initial model proposed by Kapeller and Schütz (2014) combines the Minskyan notion of financial instability with the Veblenian concept of relative consumption concerns within a Post Keynesian stock-flow consistent framework (on the latter, see Lavoie and Godley, 2002; Godley and Lavoie, 2007). Both features have been addressed in the literature so far, but to our knowledge this is the only framework that combines them within a single model. Minskyan models usually focus on corporate investment (see, e.g. Delli Gatti *et al.*, 1994; Dos Santos, 2005; Franke and Semmler, 1989; Keen, 1995, 2013; Meirelles and Lima, 2006; Skott, 1994; Taylor and O'Connell, 1985; Tymoigne, 2006), where Palley (1994, 1997) is the only exception that we are aware of who concentrates on consumption demand. Post Keynesian models accounting for relative consumption concerns include Barba and Pivetti (2009), Davanzati and Pacella (2010), Dutt (2005, 2006, 2008, 2012), Hein (2012), Kapeller and Schütz (2015), Palley (2010) and Zezza (2008). Another distinct feature in Kapeller and Schütz (2014) is the possibility of household bankruptcies.

[15] The online appendix is available at the journal web page.

For simplicity we assume that worker households initially consume all of their income while capitalist households save part of it. Furthermore, we assume that wage income is distributed equally across the two types of worker households in the first period, where we assume that one period reflects one quarter. However, in the following eight periods, the second group of households experiences a loss of income relative to type 1 households, whose share in national income remains constant. Moreover, we assume that the second group of households partly tries to keep up in consumption expenditures with the first group of households, which is reflected in the following aggregate consumption function for group 2 households:

$$C_{2,t} = \begin{cases} Y_{2,t} & for \quad Y_{2,t} \geq Y_{1,t}\beta \\ (1-\alpha)Y_{2,t} + \alpha Y_{1,t}\beta & for \quad Y_{2,t} < Y_{1,t}\beta \end{cases} \tag{2}$$

According to equation (2), aggregate consumption demand of type 2 households (C_2) is equal to their disposable income minus debt payments (Y_2), i.e. wage income minus labour income tax minus interest and installment payments,[16] as long as this income is not below that of group 1 households (Y_1). In this context, β represents the ratio of the number of type 2 to type 1 households. As soon as the income of type 2 households falls behind, their consumption is given by a weighted average of their own income and average consumption of group 1 households. It is assumed that firms' supply adjusts to demand in each period.

Moreover, we assume a Minskyan financial sector that is willing to lend to type 2 households as long as their disposable income minus debt payments exceeds a threshold value, the margin of safety (θ). The relevant condition for judging the creditworthiness of group 2 households is defined as

$$Y_{2,t} \geq \theta_{2,t}. \tag{3}$$

The concept of this margin of safety is based on the theory of Minsky (1986). He suggested that within periods of perceived economic stability, lenders become more confident and thereby increasingly provide credit to people with low income, i.e. the margin of safety, defined as the difference between the clients' income and his or her monthly due loan payments, decreases. Another argument for such behaviour is that lenders increasingly base their decisions on (expected) collateral values and thereby shift their focus away from the borrower's income, i.e. a lower level of income is required for a given level of credit. Also, regulations are relaxed partly due to regulatory capture and because regulators are outstripped in monitoring capacity relative to a booming financial sector. Additionally, the financial sector generates a stream of innovations that allows it to circumvent existing regulations. All of these developments may have a positive influence on the overall supply of credit and thereby also favour the supply

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[16] Income for group i workers (Y_i) is defined as

$$Y_{i,t} = (1-\hat{\sigma}_w)w_{i,t}N_{i,t} + \lambda_{t-1}M_{i,t-1}, \text{ where } \lambda_{t-1} = \begin{cases} r_D & for \quad positive \quad deposits \\ r_{L,t-1} + \phi & for \quad negative \quad deposits \end{cases}$$

Here, σ_w denotes the labour income tax rate, w_i, N_i and M_i the wage rate, employment and deposits of type i workers, respectively, r_D and r_L the interest rate on positive deposits and negative deposits (loans) and ϕ the installment rate.

of credit to people with low income. However, if there are signs of economic distress, a regime switch occurs and lenders become more cautious. This change is reflected by a rise in the margin of safety, which could lead to a 'sudden stop' on further lending. Our model captures this process through a simple relation: We assume that the margin of safety declines slowly within periods of perceived stability and increases rapidly within periods of economic distress. Thereby we define periods of 'perceived stability' as periods without reported bankruptcies and periods of 'economic distress' as those in which bankruptcies occur. Moreover, we assume that an increase in the leverage ratio of the financial sector (LR) also leads to a gradual increase in the margin of safety as it raises the sector's risk perceptions (D…total debt outstanding, E…bank equity, M… deposits):

$$\theta_t = \theta_{t-1}\left(1+\mu_t\right)+\xi\Delta LR_{t-1} \tag{4}$$

$$\mu_t = \begin{cases} -\gamma \ \textit{for perceived stability} \\ \tau \ \ \textit{for economic distress} \end{cases}, \quad \tau \gg \gamma$$

$$LR_t = \frac{D_t}{E_t}, D \text{ denotes the amount of negative deposits } \left(M < 0\right)$$

Bankruptcy, i.e. the inability to service debt, occurs once debt payments exceed disposable income minus subsistence-level consumption, where the latter is the absolute lower bound of consumption: $Y_{2,t} < C_{2,t}^{\min}$. If this situation occurs, banks have to write off a certain proportion of the dept of type 2 households (*cancel₂*):

$$cancel_{2,t} = \chi_t \cdot \left(-M_{2,t}\right) \tag{5}$$

$$\chi_t = \begin{cases} x \ \ \textit{if credit constrained and } \ Y_{2,t} < C_2^{\min} \\ 0 \ \ \hspace{4em} \textit{otherwise} \end{cases}$$

Here M_2 denotes the consolidated financial balance of type 2 households, which is negative in case of indebtedness, and χ is a parameter that takes on a positive value (x) if bankruptcy occurs and is equal to zero otherwise. These write-offs improve the financial situation of households, but impose losses to the banking sector, thereby reducing its equity (E):

$$\Delta E_t = (1-\pi_{b,t})\Pi_{b,t} + bailout_{b,t} + bailout_{bf,t} \tag{6}$$

$$\text{where } \pi_{b,t} = \begin{cases} 1 \ \ \ \textit{for } \ \Pi_{b,t} \geq 0 \ \ \textit{and} \ \ E_t \geq \Psi \\ \vartheta \ \ \ \textit{for } \ \Pi_{b,t} \geq 0 \ \ \textit{and} \ \ E_t < \Psi \\ 0 \ \ \ \hspace{2.5em} \textit{for } \ \Pi_{b,t} < 0 \end{cases}$$

In the above equation, π_b denotes the ratio of distributed to total bank profits (Π_b). We assume that all losses ($\Pi_b < 0$) are retained within the banking sector and thereby reduce equity, while positive profits are fully distributed as long as

equity is not below its target value (Ψ). In the latter case they are only partially distributed ($0 < \vartheta < 1$). Furthermore, bank equity can also be increased through government bailouts ($bailout_b$) and bank fund bailouts ($bailout_{bf}$)—a feature we discuss below.

In order to keep the model as simple as possible, we assume that the government initially runs a balanced budget financed through taxes on income. It will only incur debt in the case of extraordinary policy measures induced by a financial crisis.

Firms retain part of their profits and distribute the rest to capitalist households. Aggregate investment I depends positively on the utilization of production capacities (z, where Y denotes aggregate output and $Y^\star$ maximum output determined by the capital stock K), the rate of return (R, where Π_f denotes firm profits) and government expenditure (G), where the latter enters through its impact on infrastructure, education and research (Dutt, 2013).[17] Moreover, it depends negatively on the leverage ratio of the financial sector (LR). The latter allows us to account for the fact that deteriorations of banks' balance sheets lead to tighter credit conditions for firms and, hence, less investment.

$$I_t = i_0 + i_1 z_{t-1} + i_2 R_{t-1} + i_3 G_{t-1} - i_4 LR_{t-1}, \tag{7}$$

$$\text{where } z_t = \frac{Y_t}{Y_t^*}, \; Y_t^* = \upsilon K_t, \; R_t = \frac{\Pi_{f,t}}{K_t}$$

The introduction of relative consumption concerns and the specific model of the banking sector give rise to boom and bust cycles. Subsistence-level consumption and the possibility of household bankruptcies thereby establish some kind of floor for the economy. Different policies subsequently modify this floor and generate different trajectories of economic recovery. These are analysed in the following.
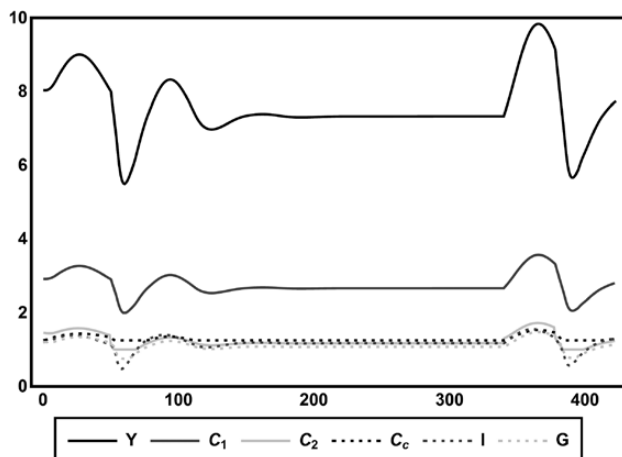
3.1. The laissez-faire scenario

The first variant of the model gives the same basic result that Kapeller and Schütz (2014) have referred to as Minsky–Veblen cycles in the absence of any government intervention: As can be seen in Figure 1, which shows the development of GDP and its components, the fall in wages of group 2 households within the first eight periods (see Figure 2) leads to a rise in GDP. This is because workers' total consumption declines only marginally due to relatively loose credit financing. At the same time, lower wages increase the rate of profit for firms. This leads to higher investment, higher firm profits and rising bank profits resulting from higher interest payments of group 2 households. These profits again increase the consumption of capitalist households.[18] This debt-led growth phase fades within 50 periods as group 2 households eventually start reducing consumption due to rising debt payments.[19] The reduction in spending gradually leads to a recession, which turns into a financial crisis around period 60 as soon as banks stop or restrict lending when group 2 households' disposable income minus
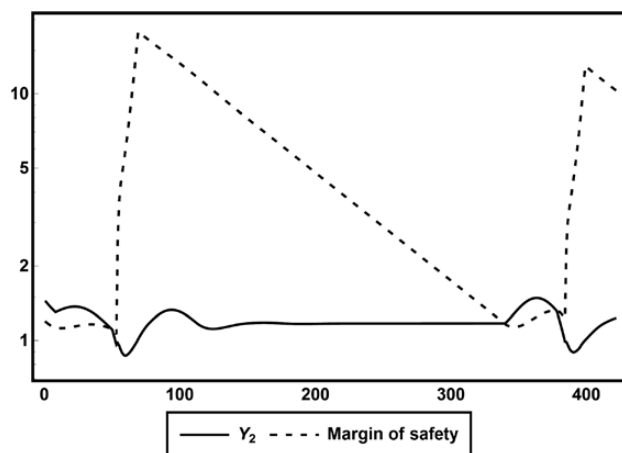
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[17] For the empirical evidence, see Mazzucato (2014).
[18] This dynamics is similar to the one obtained in Palley (1994, 1997).
[19] Kapeller and Schütz (2015) have also called this debt-led growth phase a 'consumption-driven profit-led regime'.

Fig. 1. Simulation results for the laissez-faire scenario: main aggregates (vertical axis: absolute values of GDP and its components)

Fig. 2. Simulation results for the laissez-faire scenario: Income of type 2 households and margin of safety (logarithmic scale)

debt payments falls below the margin of safety (see Figure 2). When households face such a 'sudden stop', they are forced into bankruptcy and reduce their consumption spending to the subsistence level. The resulting drop in consumption leads to a downfall in GDP. In consecutive periods of bankruptcy, banks have to write off some portion of their outstanding loans, which reduces their equity and drives up their leverage ratio. In this period of economic distress, the margin of safety increases strongly, which cuts off group 2 households from the credit market for an extended period of time as recovery of confidence occurs only gradually. Government spending also drops sharply as tax revenues decrease and—by assumption in this scenario—the government pursues a balanced budget. Falling capacity utilization, falling rates of return and falling government spending also reduce investment, which is further depressed by tighter credit provision due to equity losses in the banking sector.

The period of bankruptcies ends when, due to the enforced debt write-offs, the remaining debt of type 2 households has reached a level at which they can service debt payments out of current income again (around period 70). In turn, the economy recovers as gradual repayments decrease the debt burden of type 2 households and relatively more is spent on consumption than on debt payments. Bank equity also recovers as bank profits become positive again. As investment and government expenditure also pick up, the economy recovers and GDP reaches its pre-crisis level (around period 100). This follow-up boom and the subsequent recession are part of the cyclical adjustment process that leads to a new temporary level of GDP from about period 190, which is significantly lower than its initial level, since in this scenario the recovery is wage led in the absence of consumer credit. Hence, if credit dynamics does not kick in, redistribution towards profits will depress consumption more than it encourages investment (see Kapeller and Schütz, 2015).

In this temporary period of stability, group 2 households are cut off from consumer credit. However, as time goes by, the Minskyan dynamics discussed above return (around period 340). This is reflected in the gradual decline in the margin of safety, as shown in Figure 2. Once the margin of safety has declined sufficiently, the next debt-led boom sets in and dynamics repeats itself in the same manner. What can be seen from this scenario is that the downfall from a credit-led boom comes in two phases. First, there is the immediate impact of a credit constraint on the segment of the household sector which has been considered to be bankrupt; a situation similar to the US sub-prime crisis. Second, the impact of defaults, of a downturn in GDP and the fall in profits of the banking sector leads to a sharp deterioration of the balance sheets of banks and triggers a rapid shift of credit supply behaviour as modelled through the 'margin of safety'. In the laissez-faire scenario, there is no policy support forthcoming to change the situation of the banks or that of the debtors and potential borrowers. Hence, the recovery of bank behaviour from such a financial and economic crisis takes a long time, as indicated by the very slow reduction of the 'margin of safety'. We have modelled this in a rather extreme manner in this scenario, with an interval between a first 'debt-led' bubble and the next one being about 70 years (just as from the Great Depression in 1929 and the more recent Great Recession in the new millennium). We shall see in the following scenarios that one of the distinguishing characteristics of policy interventions of any kind is to significantly shorten the tranquil period before the reoccurrence of 'debt-led' boom phases and subsequent crashes.
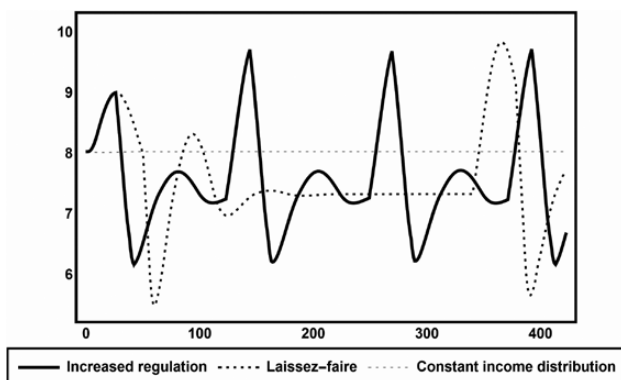
3.2 Policy scenarios

In the following, we discuss different policy interventions in the context of a financial crisis. Specifically, we investigate the consequences of five stylized policy options: 1) bailing out banks, 2) fiscal stimulus, 3) bailing out households, 4) establishing a bank fund to safeguard against bank failures, and (5) increasing financial regulation. The evolution of GDP as implied by the scenarios is shown in Figures 3 and 4, where each of the panels compares the respective policy scenario to the laissez-faire case and the level of GDP that would prevail if income distribution stayed constant so that there are no relative consumption concerns and, hence, no 'Minsky–Veblen cycles'. The whole set of results can be found in the online appendix.

In all the policy scenarios, we limit the amount of government spending by the amount that the government would need to spend on fully bailing out banks in the respective scenario (see Section 3.2.1 below). This is our way to normalise government
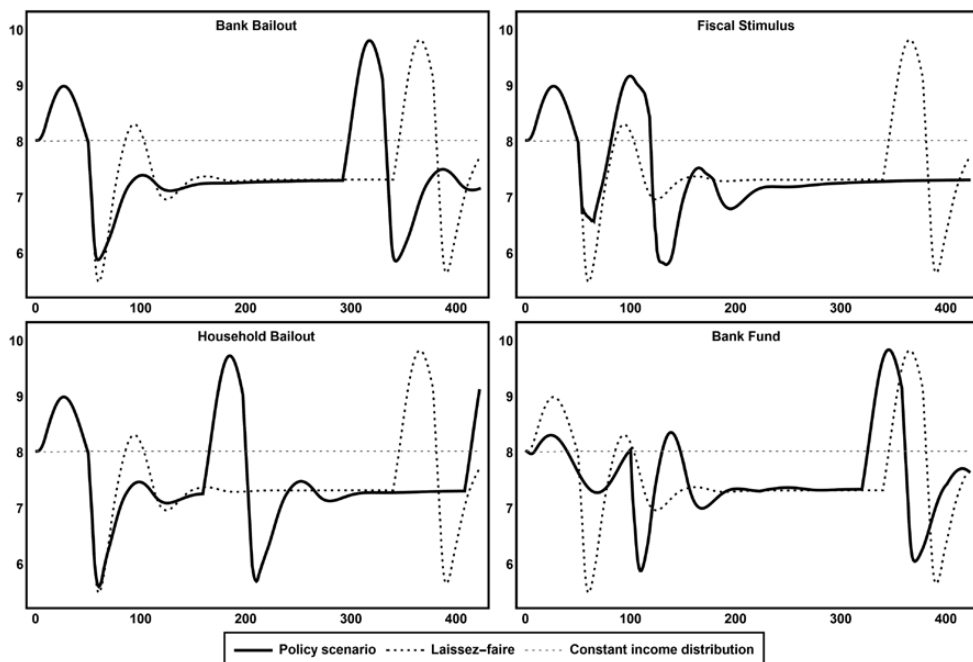
Fig. 3. Comparison of GDP developments under different government policies

Fig. 4. GDP developments under increased regulation vs. laissez faire

actions across the different scenarios in order to compare the impact of different policy alternatives. Since the results depend to some extent on the chosen parameter values, the outcomes should be interpreted in a qualitative rather than a quantitative way.[20] The purpose of the model is to illustrate whether and how certain policies stabilize the economy and not to make, e.g. definite statements about whether average output is greater in one policy scenario compared to the other.

3.2.1 Bank bailouts. In the first policy scenario, the government focuses solely on bailing out banks. For the purpose of our model, we assume that the government

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[20] For some sensitivity test of the robustness of our results, see the online appendix.

refunds banks to compensate for the losses incurred due to household bankruptcies, i.e. defaults on the repayment of loans. As shown in the upper left panel of Figure 3, the government can successfully mitigate the downturn, which is less deep compared to the laissez-faire regime. The reason is that bailouts preserve banks' equity, which avoids some of the credit crunch that the firm sector would have otherwise experienced and thereby avoids some of the negative impact on investment. Another difference to the laissez-faire scenario is that during the recovery GDP does not temporarily reach its pre-crisis level. The reason is that government expenditure picks up less during the recovery as the government itself faces debt repayments under a balanced budget constraint. Later, GDP stabilizes again temporarily (around period 200) at a similar level than in the laissez-faire scenario. However, the next boom-bust cycle starts all over again once Minskyan dynamics cause the margin of safety to decline sufficiently (around period 300). Interestingly, the next boom happens significantly earlier than in the laissez-faire scenario, as bank bailouts increase the frequency of the cycle. The reason is that bank bailouts avoid some of the rise in banks' leverage ratios that would have otherwise occurred, which dampens the rise of the margin of safety during crisis.

3.2.2 Fiscal stimulus.   In this scenario, the government sector uses the amount of money, which in the previous scenario would have been used for bank bailouts, for active fiscal policy.[21] The outcome of this scenario is shown in the upper right panel of Figure 3: The fiscal response dampens the slump in GDP substantially compared to the laissez-faire scenario. The size of the stimulus package in this case is sufficient for the economy to switch back to its initial growth trajectory (around period 70), with GDP returning to the level of the boom periods (around period 100). The reason for this relatively quick recovery is that the stimulus package dampens the fall in aggregate income and employment. This reduces the losses of banks substantially compared to the laissez-faire case, because it improves the solvency of type 2 households. The resulting flow of income also allows banks to recover their equity faster. For these reasons the margin of safety increases only moderately. Lending to type 2 households can therefore resume a few periods after the initial impact of the crisis. When this happens, the Minsky–Veblen cycle starts all over again. However, from this time on, when the financial crisis occurs (around period 120), the slump is much deeper and would in fact be even deeper if the government did not step in with another fiscal stimulus package. During this slump, household bankruptcies and subsequent bank losses let banks' margin of safety soar, so that households will be cut off from credit for much longer. The reason for this deeper contraction and more prolonged period of recovery of the banking system lies in the earlier dampening impact of government spending on the size of the first recession and the beneficial impact this had for banks' balance sheets. This means that the financial system did not experience the same degree of 'shock' as in the laissez-faire scenario. Therefore, the margin of safety did not rise as much and the banks' credit behaviour returned more quickly to being risk-seeking. The outcome of this is a second and deeper debt crisis and slump. Finally, once the phase of subsequent household bankruptcies and bank losses has stopped, the economy starts to grow again (around period 140) and converges cyclically to a new temporary level of

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[21] Since these amounts can be quite large, we assume that the government does not spend more than 30% of the deviation of current output from its 10 period mean at once. It continues to do so as long as output is below its 10 period mean or until cumulative stimulus expenditures reach the level of implicit bank bailouts.

GDP. Since the government has to intervene twice in a row, this scenario witnesses the largest policy expenditures and subsequent increase in government debt. We return to this issue at the end of this section in Figure 6. This result implies that, while fiscal stimuli are successful in counteracting initial downturns, they do not remove the underlying causes of financial fragility. On the contrary, they could lead to a faster and more intense reoccurrence of a Minsky–Veblen cycle.

3.2.3 Household bailouts. In the third scenario, we assume that the government uses the funds that it would take to bail out banks for bailing out indebted households. As can be seen in the lower left panel of Figure 3, this policy contributes little to dampening the initial slump: GDP nearly drops to the level of the laissez-faire scenario. It also slows down the initial recovery process, because the government has to repay incurred debt afterwards and therefore has to cut spending. However, what changes substantially is that the return to a debt-driven boom happens much earlier (around period 160) compared to the bank bailout scenario.

The reason is that bailing out banks does not make much of a difference to indebted households: although in this scenario the government intervenes directly to reduce the debt position of the 'sub-prime' segment of the household sector, households do not repay the major part of their debt in both scenarios, as they receive either write-offs by banks as in the laissez-faire scenario or a bailout by the government. For the banks, however, this change in polices does make a difference. As households go bankrupt less frequently when they are bailed out directly, banks become less cautious in their lending behaviour in the future as compared to a case of successive bank bailouts. Bailing out households thus substantially reduces the time between the debt-driven growth cycles and makes boom-bust credit cycles more frequent, as it invites riskier behaviour on the side of banks.

3.2.4 Bank fund. The fourth scenario introduces a bank fund, which resembles the concept of the capital conservation buffer that is part of the Basel III regulatory framework and will be gradually phased in between 2016 and 2019 in participating countries.[22] In our model, banks devote a certain share of their profits to fund a capital buffer, which can be used in times of economic distress to cover the losses incurred due to household bankruptcies. Such a 'self insurance' fund of the banking system is intended to privatise bank losses by effectively increasing the target level of bank equity (Ψ) so that no government interventions are required in a financial crisis. The size of the resulting bank fund is limited to the level of GDP in period 1, as banks stop their contributions once this level is reached. If the buffer depletes below this level due to debt write-offs, banks are required to contribute again. The compensation for defaulting loans that can potentially be received by the banks is limited by the amount of assets accumulated in this fund. The government is assumed to run a balanced budget at all times and does not intervene through bailouts. Under this policy regime the initial debt-driven boom is significantly dampened due to reduced distributable profits in the banking sector (see lower right panel of Figure 3). However, as in the previous scenarios, when household debt grows larger and households reduce consumption, the economy enters a recession (around period 20). This time, however, the recession does not lead into a financial crisis to the same extent as in the other scenarios. As the dampened boom goes along with a smaller overall increase in debt, the margin of safety does not rise as much in this phase as in the other scenarios. Households are not

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[22] BIS (2010 [rev. 2011]); See BIS (2016) for an overview of the current state of its implementation.

cut off from borrowing, and banks are not compelled to write off loans. Nevertheless, also the bank fund scenario cannot fully avoid financial crises. At some point during the second boom (around period 100) and before the recession, group 2 households' disposable income minus debt payments falls below the banks' margin of safety. The subsequent decision of banks to stop lending leads to an end of the boom and prompts the type of financial crisis we have seen in the previous scenarios. The difference is that this time, bank losses are covered by the bank fund and the government does not have to take over debt, which would slow down the recovery process, as its fiscal space would be constrained by debt payments. Consequently, the economy recovers very quickly once sufficient household debt has been written off, though it reaches pre-crisis levels only temporarily (around period 140). During this period of stability, banks contribute again to the bank fund, which in this phase reaches its upper limit (around period 220), and banks can stop contributing, as can be seen in the lower right panel of Figure 6. Eventually, the economy enters another boom-bust cycle once the banks' margin of safety has decreased sufficiently (around period 320). This time the boom takes a similar shape as in the laissez-faire scenario, because bank profits are not reduced by contributions to the bank fund, since no more contributions to the bank fund have to be made from around period 220 on (see the lower right panel of Figure 6). Though the bank fund does not prevent financial crises, it substantially dampens the downfall around period 370 without causing any increase in government debt.

3.2.5 Financial market regulation.   Finally, we look at stricter financial regulation. We assume that regulation is implemented in such a way that changes in the banks' leverage ratio have a larger impact on their credit provision to the household sector through changes in the margin of safety, i.e. ζ in equation (4) increases. Then we rerun the
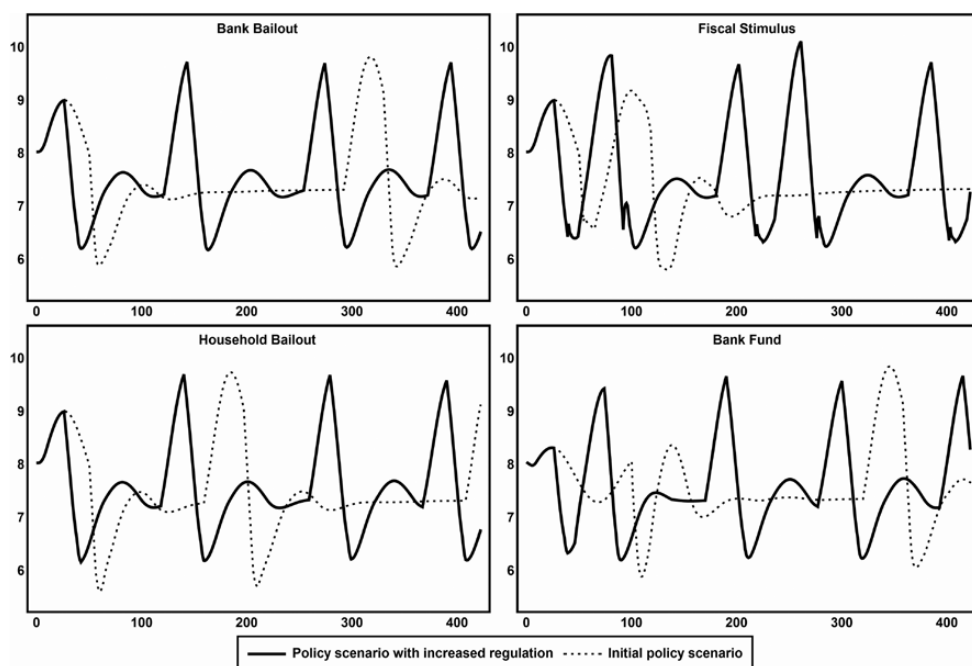

Fig. 5. Comparison of GDP developments under different government policies with and without stricter regulation

previous scenarios under this assumption of stricter regulation and compare the outcomes. The result is displayed in Figure 5: The economy is still driven by Minsky–Veblen cycles, but the extent of both booms and busts is dampened. The reason is that banks stop lending to type 2 households earlier, bringing the boom to an earlier end. Hence, households end up less indebted and banks suffer fewer losses. Furthermore, we observe a rise in the frequency of the cycles. Since the margin of safety recovers faster, households regain access to credit relatively early. This implies that the tighter the degree of regulation, the more the cycle decreases in terms of amplitude and increases in terms of frequency.

We also observe that stricter financial regulation leads to a significant decrease in policy expenditures across all scenarios. This can be seen in Figure 6, which displays cumulative bank bailout payments (upper left panel), cumulative fiscal stimulus expenditure (upper right panel), cumulative household bailout payments (lower left panel) and the stock of the bank fund (lower right panel) for the initial scenarios from Figure 4 (dotted line) and the scenarios from Figure 5 (black line). In each of the first three panels, cumulative policy expenditures (for bank bailouts, fiscal stimulus or household bailout) increase during the crisis periods (compare to Figures 4 and 5). Hence, increased regulation (black lines) causes these expenditures to move upwards more frequently, as crises occur more often. However, as these crises do only reach much smaller amplitudes, less policy intervention is required eventually. Conversely, in the initial scenarios (dotted lines), the expenditures increase less frequently, but in much larger steps since more severe crises involve more policy intervention. In the fourth panel (bank fund),
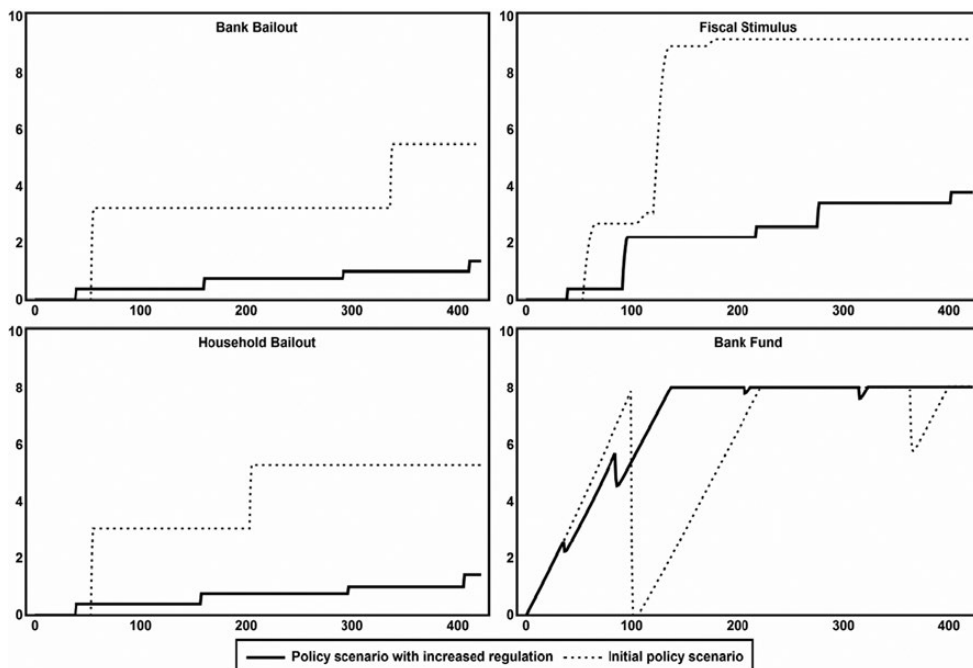
Fig. 6. Policy expenditures in policy scenarios 1–4 under initial assumptions and under stricter regulation (the lower right panel shows the evolution of the bank fund stock; other panels depict cumulative policy expenditures by the government)

accumulated bank funds move up until around period 100 in the initial scenario (dotted line) only to be fully depleted in the subsequent (very severe) crisis. Afterwards, the fund reaches its upper limit (around period 220) only to be partially depleted in a (medium-sized) crisis around period 360. Conversely, under the increased regulation scenario (black line), the bank fund increases in steps until it reaches its upper limit around period 120, since the build-up is interrupted by two crises of minor size. Two more minor crises follow after the upper limit is reached, as the two occasions on which the level of funds declines (around periods 210 and 310) indicate.

4. Concluding thoughts

Using the theory of Minsky–Veblen cycles (Kapeller and Schütz, 2014) as a point of departure, we discussed a set of policy alternatives to confront recurring financial crises: bailing out banks, fiscal stimulus, bailing out households, establishing a bank fund and stricter financial regulation. All of these policies helped mitigate the impact of financial crises on aggregate output. In the case of the first three, the price for stabilization is a rise in public debt that slows down output growth during the recovery. In this respect, the latter two policies have the crucial advantage that they do not inflict any burden on government debt.

In general, all of the discussed measures shorten the time interval between financial crises, as less intense crises also lead to a lowered attention of the financial sector to financial risk. In our simulations, which are designed to track the dynamics of credit-led booms and busts based in increasing income inequality and a Minsky-type financial system, we arrive at a wide range of periodicities (i.e. the time passing between two major slumps). Specifically, these periodicities range from about 70–80 years in the laissez-faire scenario to 10 years in the fiscal stimulus scenario. In between are other scenarios with periodicities of 25–30 years.

How do we square this range of periodicities with the dynamics of actual capitalist economies? On one level, we can refer to the big gap between the Great Depression in the late 1920s and the Great Recession of 2009, which e.g. in the USA were both crises in which household debt played a major role. Shorter cycles, on the other hand, can be linked to real estate bubbles, which exhibit a frequency of 20–30 years. However, we want to emphasize that we observe economies going through quite distinct periods of strong political-economic changes which affect, e.g. income distributional dynamics as well as institutional change that may affect both distributional dynamics and the institutional characteristics of financial market regulation. It is clear that an analytical model such as ours will not replicate the precise sequence of the political-economic and institutional changes which take place over a specific—rather long—historical period. Rather, it attempts to extract the interplay of important features of capitalist dynamics in a stylised manner. The varying periodicities that emerge from our simulations should be seen in this way.

They show, on the one hand, that a capitalist economy which has long-run Minskyan features and which opens up credit accessibility to sections of society which did not have such access before, combined with secular tendencies of income inequality and Veblenian consumption aspirations, would lead to long-run credit-led booms and busts. This is an argument in favour of long-run periodicities: the inequalities of income distribution might establish themselves (after major political-economic breaks) over the long run and also the financial system and its regulatory structures might undergo

such long-run developments affecting its behaviour after having gone through a major shock. On the other hand, we also want to emphasise that credit-led booms and busts are an endemic feature of capitalist economies within shorter time dimensions. This is the case in an environment in which financial markets are relatively liberalised, but where a number of policy interventions take place (as analysed in our fiscal stimulus and various bailout scenarios), which leads to a dampening of the instability induced by a potentially collapsing financial system. The main result of our analysis is that such moderating influences of policy interventions can have a major impact on the frequency (and amplitudes) of credit-led boom-bust cycles.

The simulations of the model used in this paper suggest that a suitable way of breaking out of this cycle is financial regulation. Regulation dampens unsustainable booms, which in turn leads to less severe crises. This again comes along with a lesser need for policy expenditures. From our simulation exercise it follows that any government intervention that does not include stricter financial regulation and macro-prudential supervision is incomplete. Moreover, our results point to the importance of tackling inequality, since in our framework growing inequality not only leads to fluctuations in GDP, but is also accompanied by significantly lower GDP levels for the majority of periods.

If the major difference between merely mitigating the periodic downturns and trying to break out of the cycle is stricter financial regulation, we may ask ourselves how much progress has been made in this regard. At the international level, the major change in the regulatory environment has been the implementation of the Basel III agreement. Its main contribution consists of raising existing capital requirements, while at the same time adding liquidity requirements and a limit to leverage (Fischer, 2014).[23] At the same time Basel III has been criticized for not resolving central issues such as the problem associated with banks using their own models to calculate risk-weighted assets as well as covering securitization and shadow banking (Blundell-Wignal and Atkinson, 2010).

Furthermore, a lot of the international discussion has concentrated on macro-prudential supervision, which on the one hand refers to the supervision of the financial system in general and on the other hand how to deal with asset price developments with instruments other than interest rates, i.e. especially sector-specific regulatory and supervisory policies (Fischer, 2014). In the USA this discussion led to the foundation of the *Financial Stability Oversight Council* (FSOC), which was a central part of the Dodd–Frank Act. The FSOC is a coordinating committee chaired by the Secretary of the Treasury and includes the major US supervisory agencies. While an interdisciplinary agency seems to be a substantial step forward, critics have warned that the Dodd–Frank Act fails to tackle the major issue of regulatory capture and financial risk-taking by commercial banks (see Kane, 2012; Chatterjee, 2011). Similar discussions also led to the creation of new regulatory bodies at the EU level, such as the *European Systemic Risk Board* (ESRB).[24] Their

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[23] Basel III raises the minimum tier 1 capital ratio from 4% to 6% of risk-weighted assets (RWA), requires a minimum common equity tier 1 capital ratio of 4.5% of RWA, a capital conservation buffer of 2.5% of RWA until 2019, allows regulators to raise risk-based capital requirements when credit growth is judged to be excessive, sets a minimum international leverage ratio of 3% for tier 1 capital relative to total assets and introduces a risk-based capital surcharge for global systemically important banks. Furthermore, it includes a minimum liquidity coverage ratio (LCR) which is based on a self-insurance regime of high-quality liquid assets that should avoid short term illiquidity. In the USA, banks have to use the greater of the two weights produced by internal models and standardized risk weights when assessing risk-weighted assets (Fischer, 2014).

[24] These are the European Systematic Risk Board, the European Banking Authority, the European Insurance and Occupational Pension Authority and the European Securities Markets Authority (Quaglia, 2013).

activities focus on the promotion of stronger cooperation between national supervisors and the regulation of formerly unregulated entities such as credit rating agencies and investment funds. However, new or amended rules were largely resisted by individual member states like the UK and Luxembourg or watered down in a climate of financial sector lobbying and political disagreement among member states (Quaglia, 2013). Furthermore, we have witnessed first steps towards centralised bank supervision and standardised resolution procedures for failing banks in the EU. At the moment the structural consequences of these policies are still hard to assess (see Véron, 2015).[25]

We will see whether these actions are sufficient to avoid or at least mitigate the next boom-bust-bailout cycle.

Supplementary material

Supplementary data are available at Cambridge Journal of Economics online.

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[25] For a survey of national financial sector reforms, see Schäfer et al. (2015).

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