

REGIME-CHANGES IN A STOCK-FLOW-CONSISTENT MODEL

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ABSTRACT

We explore the dynamical properties of the Godley-Lavoie model with a focus on Central Bank horizons. The stability properties of modes of regulation are traced from a regime of private bank money to the current crisis with the Central Bank levers of short-term bonds issue to the emerging policy regime of long-term bonds as built-in stabilizers.

KEY WORDS

financial crises, long-term bonds

CLASSIFICATION

JEL: E12, E42

INTRODUCTION

Capitalism is a mode of regulation. Its stability properties are not given and there is no stationary state to which it converges [1]. In response, institutions, especially codes of conduct pertaining to the common good, evolve and are embodied in empirical rules. Collective beliefs are represented in formal apparatus like the monetary and fiscal powers of the state. But generally, social norms are informal codes that evolve especially when individual actions cause negative side effects on others [2]. They serve the function of restraining egoistic impulses in favour of superior collective outcomes. Norms prescribe and proscribe behaviour. Below, we will be concerned with the mechanisms of accumulation that ensure coordination between the real and the financial sphere. Cooperation between the relevant stakeholders must be tacit in a social equilibrium and we contend that individual-choice theories are a less than satisfactory level of explanation. Thus, we demur from regarding institutions as solutions of evolutionary games. Intertemporal equilibrium and stability are implied. Conventions, in this sense, may do no more than deliver a temporary equilibrium. They do not eliminate the ineluctable uncertainty under which agents must operate. Only, their representations of their dilemmas are transformed [3]. In evolutionary game theory, agents are backward-looking and naive. Their strategies, time after time, depend on past states of the world. On the other hand, cooperation can be supported over time by agents like the state that provide what the last authors referred to call “form-giving operations”. By delivering objects around which social relations can coalesce, only governments, say, can invest in form-giving policies across space and time. Indeed, the agenda of generalized Darwinism is being scrutinized critically [4, 5]. In political economy, variation is not blind nor selection passively endured, but actively pursued. In social evolution, the relative success of a “phenotype” does not depend on its capacity to reproduce but rather on the ability to assess and learn. The new principles of evolutionary biology of relevance for evolutionary economics are the systemic character of the genome which embraces cooperation, self-organization, and consciousness and the persuasive evidence that evolution is punctuated. For instance, the “new institutional” theories of finance are founded on the assumption that the macro implications of finance have to be derived from the study of the interaction between banks, financial markets, firms, and households [6]. One distinction that operates is that between liquidity and credit. The former pertains to the total volume of loanable funds available in the system, the latter to the total volume of loanable funds the banks are willing to provide. During a wave of pessimism, liquidity is rife but disbursement is low. In euphoric times, even if liquidity dries up, financial institutions will break the barriers of credit to borrowers.

Our thesis, then, is that the interdisciplinary algebra of complex systems must be forward-looking. The strategy must embrace novelty and surprise. Thus, while initial conditions matter in the particular solution of differential equations, they do not contain the path that societies may follow. In the case of the recent financial-real crisis, while many argue, after Hyman Minsky, that “it” happened in the past and will continue to happen again, the particular aspect of the present meltdown in the form of the construction of complex contracts requires special attention. Our interest lies in the revolutionary features of Federal Reserve policy to mitigate the recession. For the first time in the history of any central bank, the most important lender of last resort in the world has underwritten long-term real activity. Yet, formal models rationalizing this new stance are not to be found. We emphasize that our formulation below is a contribution to the heterodox literature on the subject. On the other side, the fungibility of the neoclassical model is being exploited and models are being written to include central bank balance sheets. “Forward-looking” must not be confused with

expectation formation by rational agents. Our model is structural, free of microeconomic optimization exercises. Variety will be generated by the state equations.

An early and unique treatment of the importance of stock-flow norms in the macroeconomic accounting process was the W. Godley and F. Cripps (1983) classic [7]. For instance, a variable like the fiscal stance played an important role in the steady state properties of the model. Recently, a completely self-contained and coherent stock-flow-consistent follow up is to be found in the W. Godley and M. Lavoie (2007) work of scholarship [8]. The role of norms is relatively muted here and with good reason. The notion of practices like the normal rate of capacity utilization in non neoclassical economics is slippery [9]. It is not generally the case that feedback mechanisms that pull the economy back to a normal state when it is out of kilter exist. Norms are only given at a particular point of time. Consequently, long-run analysis in the sense of fully-adjusted positions at normal rates is not likely to be meaningful. Attention should rest on short- or medium-run equilibria or provisional equilibria. They arise from the equality of savings and investment or between aggregate demand and supply. Furthermore, existing norms are different from targets. In truth, we can say no more than the rate of capacity utilization remains within an acceptable range in a given time frame. With radical uncertainty and the irreversibility of decisions about the capital stock, concepts like Harroddian instability might not be tractable. On the other hand, in the language of Régulation Theory drawing on the work of Pierre Bourdieu, habitus (our norms), while absorbed in extant practices, are also generative [10]. Change and even crises occur when habitus and the components of the economic fabric get desynchronized. The role of the state is immense here. The financial arms of the government, for example, can initiate a change in the rates of exchange of different forms of capital. The reactions of the old habitus no longer apply. New norms must apply to the newly constituted field. The mode of regulation coagulating since the early nineties has been christened “enlightened neoliberalism” [11]. The context is one in which the economic slowdown has been aggravated by the general hike in commodity prices. Industrial capital has dissolved its pact with labour and aligned itself with finance capital. Under the Fordist regime monetary policy was the handmaiden of fiscal policy [12]. Under financialization, the inflation rate is the sole variable of interest to the monetary authorities. The role of the state in the new dispensation is yet to be defined. In the sections that follow, the stock-flow norms that are both common across societies and that distinguish them are the degree of monopoly, unit costs, government expenditures and the direct tax rate.

All regimes are common in being successively obsessed with and then downplaying inflation in analytical discussion. There are universal constraints on the depletion of natural resources and food but Keynesian scholars focus on costs which vary from one country and region to another. At the moment, deflation is the common enemy and pulling economies out of the trap of inactivity the universal agenda. Quantities are back on the drawing board, prices have been relegated to the sidelines. Thinking about contemporary recessions in the mainstream has moved beyond sticky-wage treatments of the labour market to generating outcomes without any opportunities for Pareto-improving worker-employer bargains [13]. The focus is on job creation rather than job loss. The incentive for job creation is the margin between the productivity of a new worker and the wage to be paid, both as discounted present values. As regards termination, workers do not lose their jobs because their wages are too high. They are fired or exit because the opportunity cost in the market at large exceeds their productivity in their current job.

The Godley-Cripps and Godley-Lavoie architectures consist of sets of identities. We tease movement out of these relationships to provide a primary difference equation in the next section. The equation combines production and finance, micro and macro. The equation is stretched over the next two sections to correspond to changed monetary conditions. The first

two configurations are unstable. The introduction of the mechanism of the long-term bond provides a mild stability.

PRIVATE BANK MONEY

According to the circuitistes, firms draw on their credit lines with banks when they have to make payments. Financial intermediaries grant loans, L , and simultaneously create deposits, M . The deposits are transferred to the accounts of the employees. Output that has been produced but not yet sold constitutes an increase in inventories, ΔI . The increase in inventories is investment in working capital and the finance at this stage is initial finance. In sum,

$$\Delta L = \Delta M = \Delta I.$$

In an economy with only private banks, total gross production Y can be defined as the sum of payments to workers WB , the interest payments made by firms on their debts $r_{t-1}^L L_{t-1}$, and amortization funds [8]. The attraction of the framework emerges in the first few pages of the books in the inclusion of this fund in the accounts. Most texts ignore it because they are less than exacting in their accounting principles. Indeed, a complete model with amortization funds could generate inventory cycles with the importance of banks in the damping of those oscillations. Since our interest lies elsewhere, we exclude this component to define

$$Y = WB + r_{t-1}^L L_{t-1}$$

More familiarly, total income is the sum of wages and profits Π . That is,

$$Y \equiv WB + \Pi.$$

Now, the historic costs of current-period sales, HC , is defined as [7]

$$HC = WB - \Delta I.$$

The profit mark-up, therefore, is

$$\lambda \equiv \Pi / (HC + r_{t-1}^L L_{t-1}).$$

Finally, we introduce an identity in real terms [8]. Assume that firms produce ‘widgets’ which are identical physical objects. Then, in real terms, Y translates to production, y . In that case, unit costs $UC = WB/y$.

Putting all the equations and definitions together, we derive a markup-on-loans difference equation with the non homogenous part being the wage bill.

$$L_t = (1 + r_{t-1}^L - r_{t-1}^L / \lambda) L_{t-1} + UC \cdot y.$$

As indicated earlier, our fundamental equation combines the microeconomics of price and wage setting with the institution of relationship banking. Only the pure French circuit delivers a stationary state of the above system. Indeed, the initial disbursement of loans is the stationary state when there is no degree of monopoly and unit costs considerations are absent. Interest rates on loans charged by banks are a pathological draught at the moment of the closure of the circuit and should be equal to zero. With positive values of the above variables there is no meaningful solution.

Post Keynesians have been unappreciative of the possible historically contingency of banks in the sense we understand them [14]. In recent times, the demand for loans has risen to finance non-GDP growth. Bank finance has not gone hand-in-glove with real production. At the same time, the prospects for classical banking in the USA, in one prognosis, are rosy [15]. Since the nineties, the banking system has been steadily consolidating, capitalising on the removal of barriers to interstate banking. Canada and most European countries underwent their consolidation and merger phase in the late nineteenth and early twentieth centuries. The

outcome is few large banks along with a spread of community banks and small banks catering to local needs. The demise of Bear Stearns and Lehman has pushed other investment banks to merge with commercial banks. Thereby, they come under the rubric of federal regulation. The emergence of these universal banks, the claim goes, will return the system to the pre-Glass-Steagall institutional milieu and closer to the European model.

GOVERNMENT MONEY AND PORTFOLIO CHOICE

To the extent that holders of government debt are not the same individuals as taxpayers whose payments will service it, or, to the extent that current holders do not internalise the cost even if the ultimate debt-service liability falls on them, government debt is an asset to the public [16]. Having more or less of it, consequently, affects the optimum holding of portfolios of other assets and liabilities not excluding the desired holding of physical capital stock. Indeed, the case for Central Bank (CB) liabilities is fundamental in the context of the current debate about the future of central banks. CB liabilities are the unit of account of an economy. Even in the instance when the commercial banks' demand for reserves is nil, CBs can influence interest rates if they pay a charge on reserves with them [17].

We introduce government bills, B , which pay an interest rate r . We ignore profits from the central bank in the government budget constraint and, consequently, an additional equation in high-powered money. With G denoting government expenditure and T direct taxes [8],

$$B_t = (1 + r_{t-1})B_{t-1} + (G - T),$$

that is the government must issue fresh bonds to finance its deficit [8] and

$$T = \theta(Y + r_{t-1}B_{t-1}),$$

where θ is the direct tax rate. Both income from work and returns from assets are taxed.

With taxes endogenous the equations above combine to

$$B_t = (1 + r_{t-1} - \theta r_{t-1})B_{t-1} + \theta[\lambda L_t - \lambda(1 + r_{t-1}^L)L_{t-1}] - \theta(1 + \lambda)UC \cdot y + G,$$

(see the appendix for details). Our fundamental equation is now extended to include the items of the government budget constraint. The system is unstable. Note, for later reference, that the law of one interest rate does not hold and the policy rate is different from the market rate. The solution given by the null issue of government bonds is unsatisfactory. It is important for the CB to fix the rate of interest on its liability as a policy variable. There is no equilibrium value for a fiat unit of account [17]. However, the counterpart condition is institutionally interesting. According to the arithmetic, the level of government expenditure must be of an order in excess of the markup and unit costs in combination to ensure increasing loan disbursement. Directly, the equation describes the prospects of the recession, USA, 2007- [18]. There has been a fall in net lending to the private sector. Receipts in the form of new loans have been volatile and falling through 2008. The expectation is that gross lending will continue to fall below repayments for some time.

LONG-TERM BONDS AND CAPITAL GAINS

More government debt to service presumably implies the responsibility to raise more revenue. At the same time, a large and liquid market for securities without default risk improves the efficiency of the market for private placements [16]. The market for corporate bonds in the USA operates in a manner different from thirty years ago when, due to legislative constraints, the Treasury was effectively unable to issue long-term bonds. Indeed, the time might be ripe for central banks to embrace a neo-Schumpeterian perspective and, instead on fixing short-term targets, address long-term issues in the accumulation of assets [19].

In a related development, during the last decade, governments have begun to partially fund pension fund obligations, recognizing that implicit pension debt represents a possible inter temporal fiscal constraint [20]. Furthermore, governments are alive to the threat that financial markets may penalize them in sovereign debt markets if this pension debt is not well managed. Consequently, new government pension funds have adopted portfolio investment strategies not different from private sector asset management. The success of these arrangements in providing long-term welfare rests on financial maturity as well as the capacity to adapt and innovate. Ultimately, they are social institutions and must represent the interests of the stakeholders. It is possible to design well-governed pension and retirement income institutions, public, private, and multinational, capable of hitting the golden mean between functional efficiency and stakeholder representation. The package might be implemented with different institutional amendments.

We introduce a third component of wealth, long-term government bonds, which provides an opportunity to introduce capital gains into the model. Now the accumulation of household wealth V can be defined as

$$V_t - V_{t-1} = (YD_t - C_t) + CG,$$

where YD is disposable income, C is consumption and CG is capital gains defined as follows where BL distinguish long-term bonds from the earlier.

$$CG = \Delta p_t^{BL} \cdot BL_{t-1}.$$

The Haig-Simons definition of income as consumption plus the change in wealth has been introduced [8]. In a world with fewer options, the excess of income over consumption would increase bank deposits. That is,

$$\Delta M = YD_t - C_t$$

Putting it all together we make a detour from our main equation to examine the following difference equation in asset prices

$$p_t^{BL} \cdot BL_{t-1} = p_{t-1}^{BL} \cdot BL_{t-1} + \Delta V - \Delta M,$$

(the systems treatment is available in the appendix). The dynamics of an economy driven by the search for capital gains is plagued by the problem of unit roots. The conditions for stability are delicate. Returning to the main course, we have a government budget constraint with the fiscal levers exogenous and the addition of an additional asset [8]. That is to say,

$$p_t^{BL} \cdot BL_t = p_t^{BL} \cdot BL_{t-1} - [B_t - (1 + r_{t-1})B_{t-1}] + (G - T).$$

In a manner identical to the earlier, with a loop describing taxes, we have [8]

$$T = \theta(Y + r_{t-1}B_{t-1} + BL_{t-1}).$$

Similarly, the equations combine to deliver

$$p_t^{BL} \cdot BL_t = (p_t^{BL} - \theta)BL_{t-1} - [B_t - (1 + r_{t-1} - \theta r_{t-1})B_{t-1}] + \theta[\lambda L_t - \lambda(1 + r_{t-1}^L)L_{t-1}] - \theta[(1 + \lambda)UC \cdot y] + G,$$

(for the last time, the appendix has the formal details). Our master equation is stretched to absorb the contemporary innovation of long-term bonds. Along with the weapon of a tax rate, an additional direct weapon is the price of long-term bonds. Recall, the reciprocal of the price is the interest rate. The system decomposes with the stationary solution for the level of long-term bonds determining the quantum of short-term bonds and loans outstanding. The contrast with the earlier regime is that the quantity of short-term bonds now is positive. Only those instruments should be chosen that augment systemic stability and dampen economy-wide negative spillovers. An illustration is the use of the discount window recommended by Minsky. He supported discount window operations in institutions like life insurance

companies as long as they were occupied in ‘to the asset’ financing [21]. We have already noted that the Fed, in a first, has been providing credit directly to financial firms during the current crisis rather than disbursing liquidity rapidly to the market through open-market purchases of Treasury securities [15]. As theorists in the Social Structure of Accumulation (SSA) tradition have reminded us, the context for investment in durable assets is designed by state action [22]. Businessmen could as well turn to financial assets instead of plant and machinery in the absence of appropriate policy. Perversely, the suggestion is that the CB lender of last resort operations should be as unpredictable as possible. So-called constructive ambiguity is the defining privilege of the sovereign [23]. The first challenge faced by Central Banks during the current financial meltdown was the changing maturity composition of banks’ net demand for funding liquidity. There was an increase in the net demand for term funding relative to overnight funding. To a large extent this portfolio switch was due to the massive reintermediation of conduits. Such behaviour reflects the counterparty risk inherent in a deleveraging of the conduits. We end by recalling the evolutionary tone struck at the beginning. So-called evolutionary policy-making is the attempt, through concerted action, to anticipate and manipulate selection outcomes. The growth of the wealth of nations might also create “spontaneous disorder”. There is need for procedural welfare interventions. Policy problems are never given but continuously created in a process that involves deliberate and selective communication with specified agendas.

CONCLUSION

Commercial banking is institutionally fragile. Consequently, financial intermediation has been supported through history by CBs. The latter, in turn, have used bank rate policy to great effect. However, the current financial crisis has highlighted the tenuousness of short-term measures. The outcome might be one in which central bankers will grasp the future with all the weapons at their command. The nascent regime of accumulation is one in which the bridges between a perilous present and an uncertain future will be constructed by the two macroeconomic organs of the state working in tandem. We have offered some macro analytics of the instrumentality of the long-term bond with price-setting CBs. However, the activity results in a non-null level of short-term debt. It has also transpired that the tax rate continues to be a sharp stabilizing scythe. The policies will have to be fine-tuned to deal with the particularities of regimes. The institutional specifics include the degree of monopoly and unit costs.

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Wynne Godley passed away on May 13 this year. This paper is dedicated to his memory. The inputs of two anonymous referees to an earlier draft were most helpful. The usual disclaimers apply.

APPENDIX

GOVERNMENT MONEY AND PORTFOLIO CHOICE

In dynamical system terms, the master equation of the section is

$$\begin{bmatrix} B_t \\ L_t \end{bmatrix} = \begin{bmatrix} (1+r_{t-1}-\theta r_{t-1}) & 0 \\ -\frac{(1+r_{t-1}-\theta r_{t-1})}{2\theta\lambda} & (1+r_{t-1}^L) \end{bmatrix} \begin{bmatrix} B_{t-1} \\ L_{t-1} \end{bmatrix} + \begin{bmatrix} 0 \\ \frac{(1+\lambda)UC.y}{\lambda} - \frac{G}{\theta\lambda} \end{bmatrix}$$

Since the trace of the coefficient matrix is positive and the determinant is positive, the equilibrium is an unstable node.

The stationary solution is given by $B = 0$ and

$$-r_{t-1}^L = \frac{(1 + \lambda)UC.y}{\lambda} - \frac{G}{\theta\lambda}$$

LONG-TERM BONDS AND CAPITAL GAINS

The story of capital gains is

$$\begin{bmatrix} p_t^{BL} \\ V_t \\ M_t \end{bmatrix} = \begin{bmatrix} \frac{1}{3} & 0 & 0 \\ -\frac{BL_{t-1}}{3} & 1 & 0 \\ \frac{BL_{t-1}}{3} & 0 & 1 \end{bmatrix} \begin{bmatrix} p_{t-1}^{BL} \\ V_{t-1} \\ M_{t-1} \end{bmatrix}.$$

The eigenvalues are lined along the main diagonal. The spectral radius is unity. The origin is attractor only if that number is strictly less than one.

The complete model is given by

$$\begin{bmatrix} BL_t \\ B_t \\ L_t \end{bmatrix} = \begin{bmatrix} \frac{(p_t^{BL} - \theta)}{3p_t^{BL}} & 0 & 0 \\ \frac{(p_t^{BL} - \theta)}{3} & \frac{(1 + r_{t-1} - \theta r_{t-1})}{2} & 0 \\ -\frac{(p_t^{BL} - \theta)}{3\theta\lambda} & -\frac{(1 + r_{t-1} - \theta r_{t-1})}{2\theta\lambda} & (1 + r_{t-1}^L) \end{bmatrix} \begin{bmatrix} BL_{t-1} \\ B_{t-1} \\ L_{t-1} \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ \frac{(1 + \lambda)UC.y}{\lambda} - \frac{G}{\theta\lambda} \end{bmatrix}.$$

The equilibrium is a saddle point. Only the eigenspace associated with long-term bonds might be stable. Indeed, let us take the situation $p_t^{BL} - \theta > 0$ to begin with. As the price of long-term bonds begins to fall (the rate of interest on long-term bonds increases) and direct tax rate begins to rise, a qualitative change occurs at $p_t^{BL} - \theta = 0$ called a saddle-node or fold bifurcation.

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PROMJENA REŽIMA U KONZISTENTNOM MODELU ZALIHA I TOKOVA

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SAŽETAK

Istražena su dinamička svojstva modela Godley-Lavoie s težištem na središnjoj banci. Svojstva stabilnosti načina regulacije su praćena od režima privatnog novca banke do aktualne krize s stabilizatorima središnje banke u vidovima od kratkoročnih obveznica do izvirućeg režima dugoročnih obveznica.

KLJUČNE RIJEČI

financijska kriza, dugoročne obveznice