Contributions in Stock-flow Modeling

Essays in Honor of Wynne Godley

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6

Three Balances and Twin Deficits: Godley versus Ruggles and Ruggles

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6.1 Introduction

Wynne Godley was my colleague at the Levy Economics Institute of Bard College, a mentor on macroeconomics, and a co-author on one paper. Most of all, he was a dear friend. We shared many interests over the years, from peering endlessly at data to eating well and taking long walks on the beautiful grounds of Bard College. My first interaction with him was when I happened to be walking past his office and he summoned me in to look at the simulation runs of his model – which of course I found completely fascinating. Very many subsequent hours were spent doing that. Wynne had a wonderful intuitive feel for empirical patterns. He could 'see'. Like Joan Robinson, he had a limited background in math and was therefore 'obliged to learn how to think,' which he did very well indeed. And he was not afraid to conclude that he had been wrong: I can remember conversations, in person or on the phone, which began with the phrase 'Look here, I have been talking absolute nonsense.' The subsequent discussion was often punctuated by long silences which I learned to accept with equanimity. On the other hand, where Wynne felt the error was mine, he was far more polite. This chapter is a small tribute to his memory, in partial thanks for the many things I learned from him.

Wynne's adoption of the GDP national accounting identity in terms of three sectoral balances always played a crucial role in his macroeconomic analysis. In keeping with the post-war empirical evidence at the time, the earliest version of the three balance approach assumed that the private sector (household plus business) balance was essentially zero. Then the two remaining sectoral balances would offset each other. This led to the famous 'twin deficit' hypothesis of the New Cambridge

approach delineated in Fetherston and Godley (1978). In their fascinating macroeconomic text, Godley and Cripps (1983) attempted to provide a theoretical justification for the empirical finding that the private sector balance tends to be small. They posited that the private sector as a whole had some desired ratio of the stock of financial assets to the flow of income. Changes in the aggregate savings rate were then the means of maintaining the actual ratio at its desired level. This in turn implied that in a static economy the equilibrium private sector balance would be zero.

On the other side of the Atlantic, over a similar interval of time Richard and Nancy Ruggles (Ruggles and Ruggles, 1992) had arrived at very similar results on the private sector balance, albeit by a different route and with a different focus. The Ruggles' empirical investigation of US post-war savings led them to conclude that average household savings was zero because households' income not spent on consumer nondurables was largely spent on consumer durables (that is, for what they called household 'capital formation'), so that in the end all household income was used for consumption. At the same time, business savings was essentially aimed at financing business capital formation (investment). Their dual-capital-formation hypothesis implied that the private savings equaled private investment, so that the private sector balance was essentially zero. What is particularly interesting in this history is that both sides emphasized that the *flow* of savings has a *stock* purpose. This turns out to imply that the aggregate savings rate is endogenous in the short run – not exogenous as is so often assumed in both orthodox and heterodox macroeconomic analysis (Shaikh 2009, pp. 476–82).

6.2 The three balances

It is useful to approach the famous three balances relation sideways, so to speak, in order to understand its true import. Aggregate demand for domestically available goods (D) is the sum of consumption (C), investment in desired stocks of fixed capital and inventories (I), government (G) and export (X) demands, while domestically available supply (Q) is the sum of domestic supply (Y) and imports (M). Let T = total private sector (households and business) taxes. Then over any time period, aggregate excess demand (E) is the difference between aggregate supply and demand. This can in turn be written in terms of three sectoral contributions to excess demand: the private sector deficit, which is the excess of its expenditures over its disposable (that is, post-tax) income

$[(C + I) - (Y - T)]$; the government deficit $[G - T]$; and the foreign trade surplus $[X - M]$.

$$E \equiv D - Q = (C + I + G + X) - (Y + M)$$
$$= [(C + I) - (Y - T)] + [G - T] + [X - M] \quad (1.1)$$

There is nothing in this *ex ante* relation which requires that the three balances add up to zero. If aggregate demand happened to exceed aggregate supply at given prices, then the excess demand would lead to undesired changes in inventories: $E = -\Delta INV_u$. National accounts incorporate the undesired inventory change into 'investment,' redefined as the sum of desired fixed investment and desired inventory change *and* unplanned inventory change. This accounting device converts the *ex ante* non-zero balance in equation (1.1) into an *ex post* zero-balance identity.

$$[(C + (I - E)) - (Y - T)] + [G - T] + [X - M]$$
$$= [(C + (I + \Delta INV_u)) - (Y - T)] + [G - T] + [X - M] = 0 \quad (1.2)$$

The trouble is that *an* ex post *accounting identity is not a constraint*: any sum of three sectoral balances can be accommodated in equation (1.2). Theoretical economists therefore implicitly or explicitly add a further condition: that aggregate demand and supply gravitate around each other over some period of time called 'the short run'. The imposition of this equilibrium condition is what converts the three balanced identity in equation (1.1) into a constraint operative over some putative 'short run'. For convenience in subsequent use, the constraint is written to state that the sum of the private sector balance (the excess of income over expenditure) and trade deficit is equal to the government deficit.

$$E = -\Delta INV_u \approx 0 \quad (1.3)$$

$$PB + [M - X] \approx [G - T] \quad \text{where } PB \equiv [(Y - T) - (C + I)]$$
$$= \text{the private sector balance} \quad (1.4)$$

How long is the supposed short run? Neoclassical authors typically assume that equilibrium is instantaneous and continuous. Keynes generally focuses on comparative statics, so time disappears from view. But elsewhere he does recognize that production, and hence the working out of the multiplier, takes time. In his exposition he tends to switch

back and forth between a given observational time period which is short enough to investigate the workings of the multiplier and a period long enough for the multiplier to work itself out and hence for short-run equilibrium to obtain (Asimakopulos 1991, pp. 52, 67–8). Modern macroeconomic analysis skips over these issues by simply assuming that supply and demand equilibrate fast enough to allow us to treat observed data (usually quarterly data in macroeconomics) as representing equilibrium outcomes (Godley and Lavoie 2007, p. 65; Pugno 1998, p. 155). Godley and Cripps implicitly do the same thing by treating the identity as a 'budget constraint' within the annual or quarterly time period defined by available data (Godley and Cripps 1983, pp. 33, 60–1). On the other hand, from Walras' Law the mutual adjustment between aggregate demand and aggregate supply is linked to the adjustment between money supply and money demand. One estimate of the latter yields a 50 per cent closure in two quarters, so that it takes about 12 quarters to achieve a 99 per cent adjustment (McCulloch 1982, p. 27). Finally, given that excess demand is expressed through unplanned change in inventories, it is useful to note that what we now call the 'business cycle' refers to the three–five-year (12–20-quarter) inventory cycle (van Duijn 1983, pp. 7–8). Continuous balance versus three–five-year balance obviously have very different implications for practical macroeconomics.

In preparation for what follows, it is useful to note that the private sector balance can be expressed in terms of the balance between aggregate private savings and investment. The excess of disposable private income over consumption expenditures is private savings $(Y - T) - C = S_p$, which can in turn be written as the sum of household savings (S_h) and business savings, that is, retained earnings (RE).

$$PB = S_p - I = S_h + (RE - I) \tag{1.5}$$

6.3 The twin deficit hypothesis of the New Cambridge approach

In the 1970s, Godley and his colleagues at the Department of Applied Economics (DAE) of Cambridge University transformed the three balance constraint into the Twin Deficit Hypothesis. They had discovered that at an empirical level the private sector balance in the UK, measured relative to income, was 'generally small and stable' (Dos Santos and Macedo e Silva 2010, p. 25). This led them to conclude that over the short run the other two balance ratios in equation (1.5) would tend to

mirror each other. An increase in the government deficit would therefore lead to an increase the foreign trade deficit.

$$PB \approx 0 \text{ so } \frac{[M-X]}{Y} \approx \frac{[G-T]}{Y} \text{ [Twin Deficit Hypothesis]} \tag{1.6}$$

In 1978 Fetherston and Godley (Fetherston and Godley 1978, p. 34) hypothesized that 'virtually all the disposable income in the private sector' was quickly 'spent on goods and services' (Dos Santos and Macedo e Silva 2010, p. 22). A few years later Godley and Cripps (1983) attempted to provide a theoretical foundation for this hypothesis. They posited that individual households and businesses had desired 'norms' concerning the ratio of net financial assets to income which translated into a stable aggregate norm (Godley and Cripps 1983, pp. 41–4, 60). The original Godley–Cripps argument was posed in terms of a series of highly abstract models in which various concrete factors were successively introduced and analyzed. It also was confined to a static economy (a constant level of income), because as they themselves point out their adjustment process was unstable in the context of exogenous growth (Godley and Cripps 1983, pp. 17–20, 49–51, 95–7). In what follows I will generalize both their argument and their adjustment process.

The first step is to recognize that the excess of any sector's spending over its income represents its *net* acquisition of financial assets ($NAFA$). Consider the private sector balance $PB = S_p - I = S_h + (RE - I)$. The Keynesian definition of household savings is the excess of household income over expenditures on nondurable and durable consumer goods, which is the change in household net financial assets (defined to include money and to count debt as a negative item). Similarly, the difference between business retained earnings and investment is the change in business net financial assets (which will be negative if the business sector is a net borrower). Hence the change in actual private sector net financial assets from the beginning to the end of the period is equal to the private sector balance over the period.

$$\Delta NAFA_{p_t} \equiv (S_p - I)_t = PB = \text{the private sector balance} \tag{1.7}$$

Next comes the central Godley–Cripps behavioral hypothesis that the end-of-period desired stock of the private sector's net financial assets ($NAFA^*_{p_t}$) is proportional to the period's flow of the private sector's disposable income $(Y - T)_t$ – that is, that the desired stock-flow ratio is constant. Let t = the tax rate so that total tax revenue $T = tY$.

Then the Godley–Cripps hypothesis (Godley and Cripps 1983, pp. 22, 40, 43–4, 61) implies that the desired stock of net financial assets is

$$NAFA^{*}_{p_t} = \alpha(1 - t)Y_t \tag{1.8}$$

The desired net stock is only relevant if there is some process which makes the actual net stock conform to the desired one. Godley and Cripps proposed an adjustment mechanism of the form $\Delta NAFA_{p_t} = \phi(NAFA^{*}_{p_{t-1}} - NAFA_{p_{t-1}})$ where ϕ is some positive adjustment coefficient less than one. Note that since $\Delta NAFA_{p_t} \equiv (S_p - I)_t$, where investment is determined by profitability and income is given to the individual household or firm, this implicitly supposes that it is the *private savings rate* which does the adjusting. In any case, as Godley and Cripps themselves point out, their adjustment mechanism is only consistent with a constant level of income because the path becomes unstable when growth is endogenous.[1] A similar adjustment problem appears in Harrod and Domar (Domar, 1946; Harrod, 1957; Sen 1970, pp. 10–14). In all cases, there is a simple and sensible dynamic adjustment process which is perfectly stable (Shaikh 2009, pp. 464–7). The crucial step is to recognize that a dynamic path is a *moving* target. In order to hit such a target, it is necessary to track its path with adjustments based on past errors. In the present case, the target is the desired net stock $NAFA^{*}_{p_t}$ which will generally be growing when income is growing. Hence the changes in actual net stock must make adjustment relative to the dynamic path of the desired stock. This is a perfectly general principle derived from Hicks' stock-flow adjustment principle which encompasses a stationary path as a special case (Hicks 1985, pp. 97–107). Let ε_t represent some zero-mean error process which may incorporate all sorts of serial correlation (that is, which need not be iid). Then the Hicksian adjustment process shown below is completely stable around the moving equilibrium point $NAFA^{*}_{p_t} = NAFA_{p_t}$.[2] As we can see, it involves a simple extension of the Godley–Cripps adjustment mechanism.

$$\Delta NAFA_{p_t} = \Delta NAFA^{*}_{p_t} + \phi\,(NAFA^{*}_{p_{t-1}} - NAFA_{p_{t-1}}) + \varepsilon_t \tag{1.9}$$

The stability of the adjustment process in the face of equation (1.8) implies that $NAFA_{p_t} = NAFA^{*}_{p_t} = \alpha(1 - t)Y_t$, so

$$\frac{\Delta NAFA_{p_t}}{Y_t} = \frac{\alpha(1-t)(\Delta Y_t / Y_{t-1})}{(Y_t / Y_{t-1})} = \frac{\alpha(1-t)g_{Y_t}}{1+g_{Y_t}} \approx \alpha(1-t)g_{Y_t} \tag{1.10}$$

where $g_{Y_t} \equiv (\Delta Y_t / Y_{t-1})$ = the growth rate of aggregate output << 1. In light of equation (1.7) the foregoing result implies that the private sector balance will be essentially proportional to the growth rate of GDP. Godley and Cripps, like most macroeconomists of their time except for Harrod, Domar and Hicks, assume that the level of output is constant in the 'short run' (Godley and Cripps 1983, pp. 49–51). Then equations (1.4), (1.7) and (1.10) with $g_{Y_t} = 0$ imply a zero private sector balance and hence twin deficits. More generally, for given positive growth rate g_{Y_t}, we get 'sibling deficits':

$$\frac{[M-X]}{Y} \approx \frac{[G-T]}{Y} + \alpha(1-t)g_{Y_t} \tag{1.11}$$

6.4 The sectoral savings–investment hypothesis of Ruggles and Ruggles

Ruggles and Ruggles define household savings as the excess of income over the *nondurable* consumption goods. Their empirical analysis of the US economy then leads them to conclude that household savings so defined is roughly equal to household expenditures on *durable* consumer goods, that is, on 'household capital formation.' On the business side, Ruggles and Ruggles also find that total corporate and noncorporate business savings, that is, total retained earnings, is roughly equal to total business capital formation (investment).

The observations of Ruggles and Ruggles were rooted in their intimate knowledge of the intricacies of US national income and product accounts (NIPA). They point out that the NIPA 'personal sector' includes not only households but also non-profit enterprises, and the NIPA definition of personal savings is quite different from household savings. When they correct for these and other problems,[3] they find that over the period 1947–89 cumulative household gross 'savings' is almost exactly equal to 'household gross capital formation' (purchases of consumer durables and owner-occupied housing). As a corollary, transfers of funds between households and other sectors are relatively small (Ruggles and Ruggles 1992, pp. 119–26, 156). A similar finding obtains for business savings, which is roughly equal to business investment over the long run: 'the gross savings for many enterprise sectors has been equal to or greater than their gross capital formation', while for nonfinancial corporate business the ratio of retained earnings to gross capital formation is about 90 per cent (Ruggles and Ruggles 1992, pp. 119, 157). Ruggles and Ruggles point out that their findings undermine 'the usual functional approach' which assumes that households are net savers and businesses are net borrowers (Ruggles and

Ruggles 1992, p. 161). This leads them to the general principle that each sector saves just what it needs to fund its purchases of durable goods:

> with respect to sector saving and capital formation the general rule is that each tub tends to stand on its own bottom. The household sector is not, and historically has not been, a net supplier of funds to other sectors; furthermore, the manufacturing sector does not absorb more funds than it generates. (Ruggles and Ruggles 1992, p. 160)

Several remarkable implications follow from the Ruggles' findings. First of all, household savings, defined in Keynesian fashion as the excess of household income over total consumer purchases, is essentially zero while business saving is equal to business investment. It is striking that these are the standard characterizations of savings within the classical tradition and even some parts of the Keynesian one (Marx 1967, pp. 506–7; Marx 1977, ch. 4; Robinson 1965, p. 178; Shaikh, 1988, footnote 2, p. 85). Secondly, the two results imply that aggregate private savings equals private investment, so that the private sector balance is zero. Although the Ruggles' do not make this connection, this in turn implies that trade deficits and government deficits will be twins as in the New Cambridge hypothesis. Finally, on the assumption that 'capital formation' is determined by long-run factors, this implies that it is the private savings *rate* which adjusts in response to private sector investment needs.

$$PB = S_h + (RE - I) \approx 0 \text{ because } S_h \approx 0 \text{ and } RE \approx I \qquad (1.12)$$

Ruggles and Ruggles end by focusing on a set of 'simple and rather obvious policy implications'. They conclude that 'measures designed to stimulate household savings in order to spur business investment will actually have the opposite effect because the resulting reduction in consumer spending will hurt profits and hence investment. Thus policy should focus on 'direct incentives which increase profits and induce enterprises to reinvest their own retained earnings'. In the latter regard, they note that 'from past evidence it is apparent that a high level of aggregate demand is needed for enterprises to undertake high levels of capital formation' (Ruggles and Ruggles 1992, pp. 161–2).

6.5 Summary and implications

This chapter has focused on the empirically derived notion that the private sector balance, relative to GDP, is driven by some general

principles involving the motivations for household and business savings. Figure 6.1 depicts the path of this balance in the US in the period 1947–2010. We can see that it fluctuated around a constant level of about 4.7 per cent for almost half a century. A similar pattern held in the UK, except that the average balance was somewhat smaller.

In the UK, the existence of a small and stable private sector balance led Wynne Godley and his co-authors to the realization that the trade deficit would mirror the government deficit. This became known as the Twin Deficit Hypothesis of the New Cambridge view. In their 1983 book Godley and Cripps tried to provide a theoretical foundation for their empirical finding by hypothesizing that the private sector balance was driven by a stable norm between private net financial assets and disposable income. But their hypothesized adjustment process turned out to be unstable in a growth context. One of the contributions of the present paper is to show that there is a simple and sensible modification of their adjustment process which makes it wholly stable. This leads to the general conclusion that the private sector balance will be roughly proportional to the GDP growth rate.

In the US, Ruggles and Ruggles followed the same thread of evidence to a different set of conclusions. Upon carefully decomposing the

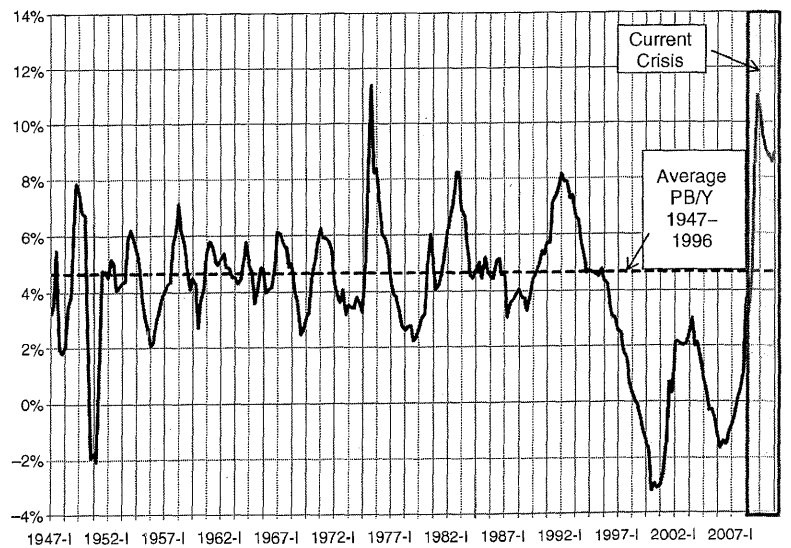

Figure 6.1 US private sector balance relative to GDP

empirical evidence on household and business savings, they found that over the post-war period the excess of household disposable income over nondurable consumer expenditures (which was their definition of savings) was roughly equal to household expenditures for durable consumer goods. Similarly, business saving (retained earnings) was close to business expenditures on new plant and equipment. This led them to hypothesize that each sector was driven by the common behavioral principle that the purpose of savings was to fund 'capital formation.' Note that from a Keynesian point of view, savings is defined as the excess of disposable income over *all* consumption expenditures. Then the Ruggles' findings imply that (under the Keynesian definition) the household savings rate is zero and the business savings rate is equal to the investment share in profit. It is striking that these are exactly the assumptions typically made by classical economists.

Both schools give rise to the implication that the savings rate adapts to investment needs. The endogeneity of the savings rate has contradictory implications for effective demand theories. On one hand, it reduces the scope of the multiplier argument. In the standard Keynesian case, any gap between investment and savings is filled by changes in the volume of output, because the savings *rate* is assumed to be unchanged. To the extent that the savings rate itself adjusts to the fill the gap, the multiplier is reduced.[4] In the Ruggles' and classical case in which households do not save and firms save what they need for investment, the multiplier is a *transient* whose duration depends on how long it takes for business savings to adapt to investment needs. On the other hand, an endogenous savings rate allow us to reinstate the notion that growth can be ruled by the expected profitability of investment as in Marx, Keynes, and Kalecki while retaining the sensible notion that actual capacity utilization will fluctuate around its normal level in the long, as in Harrod (Shaikh, 2009).

Figure 6.1 also illustrates why the notion of a stable private sector balance fell out of favor. After the mid-1990s this ratio plunged into negative territory as the private sector embarked upon a borrowing spree – with a corresponding large rise in household debt (Papadimitriou, Shaikh, Dos Santos and Zezza 2002, pp. 1, 3). The economic crisis which unfolded over the ensuing decade forced the balance sharply back into positive territory as debt reduction became paramount. While we cannot say yet where this will end up, it is certainly possible that the relative private sector balance will settle once again at some sustainable level. If so, we will be back to the era of sibling deficits: then liberal economic prescription for continued expansion in budget deficits to raise employment will result in larger trade deficits, while the conservative prescription for reduced deficits will lead to lower trade deficits but higher unemployment. These are the dilemmas of our time.

Notes

1. The Godley–Cripps adjustment mechanism $\Delta NAFA = \phi\ (NAFA^* - NAFA)$ where $0 < \phi < 1$ is in equilibrium when $\Delta NAFA = 0$, which implies that $NAFA^* = NAFA$ = constant. But since the desired net stock is proportional to aggregate income (equation (1.8), this implies that income must be constant. When inventories are made endogenous, growth also becomes endogenous. But then this particular adjustment mechanism leads to an unstable path (Godley and Cripps 1983, pp. 95–6).
2. Stability of the general adjustment process in equation (1.9) is easily proved. Define $x_t \equiv NAFA^*_{P_t} - NAFA_{P_t}$. Then the dynamic adjustment is $\Delta x_t = -\phi x_{t-1} + \varepsilon_t$, and this is stable for all $0 < \phi < 1$.
3. Ruggles and Ruggles make four major corrections: they separate households from non-profit enterprises; they remove the fictitious housing sector which arises because NIPA treats home-owners who live in their own homes as 'businesses' renting out their homes to themselves; they adjust for the fact that employer contributions to pension funds and even the earnings of these pension funds are treated as being paid out to individuals, while at the same time the actual pension payments are not counted in individual income; and they separate consumption expenditures into nondurables and durables, treating the expenditures on the latter as savings used to fund 'household capital formation' (Ruggles and Ruggles 1992, pp. 119–26).
4. Thus, if investment is greater than savings ($I > S = s \cdot Y$), with investment (I) and the savings rate (s) given, it is the level of output which must rise to bring savings into line with investment. Obviously, if the savings rate itself adjusts to the investment-savings gap, then this reduces the multiplier effect.

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