Dynamic properties of stock-flow models with stable stock-flow norms.

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Abstract. This paper analyses some properties of stock-flow models based on stable stock-flow norms, as developed by Godley and others over a number of years. We start by the analysis of the model presented in Godley – Lavoie (2001) to establish some relation between growth and stock-flow norms. An extended version of such model is developed, to incorporate the public sector, and we compare these categories of theoretical models with a stylized version of the Levy macroeconomic model. Our aim is to investigate the relation between this category of models and the literature on growth in the Keynesian and Kaleckian tradition.

1. Introduction: Non-neoclassical theories of growth

The literature on growth theory, along with most of empirical applications on sources of growth, convergence among regions or nations etc., is still dominated by the standard neo-classical approach based on a production function a la Solow. This is somewhat surprising since this theory, in its original formulation, has always performed poorly on empirical grounds, with most of actual growth[1] being explained by exogenous shifts in the production function which were assumed to depend on technical change. The poor performance of the theory has been a major motivation for a growing literature which is now identified as "new growth theory", where technical progress may be endogenous, measures of labor and/or capital may be modified to take endogenously into account technical change, etc., but always retaining the crucial assumption that growth in the economy is entirely driven by supply-side factors. Keynesian theory, which mantains that the economy is hardly ever producing at full capacity, and therefore it is demand components which determine the level of output, is at best considered to be applicable to analyze short-run deviations from the growth path, which is itself firmly tracked by the growth in available factors of production, plus technical change, may it be endogenous or exogenous.

Several "keynesian" theories of growth have nevertheless been proposed in the literature, even though they are not always easily reconcilible with each other. A feature which is common to several such models, however, is that growth is assumed, rather than generated inside the model. This is the case of most models which start from a dynamic specification of the short-run equilibrium condition

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

and usually determine growth of output Y as generating from growth in the fiscal stance, or from an unexplained rise in world demand, or from both.

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[1] We shall implicitly assume to be talking about growth in output per capita, leaving aside issues related to the growth in population.

Following Godley & Lavoie (2001, G&L from now on), in this paper we wish to investigate how models based on "watertight" stock-flow accounting and the stability of some stock-flow norms, such as those proposed by Godley and others, may be consistent with the keynesian growth literature or have some implications of their own for growth theory.

The key implications of the G&L model for growth will be discussed in the next paragraph; paragraph 3 summarizes some long-run relations between growth and stock-flow norms; we propose an extension of G&L model in paragraph 4, incorporating the public sector; and in paragraph 5 we will compare such models with the Levy macroeconomic model, developed by Godley and others over a number of years, altough our discussion will be based on a simplified, theoretical version of the model rather than the actual set of accounting equations and econometric estimates.

2. The closed economy: G&L model

We start our analysis from the model presented in Godley & Lavoie (G&E), which has some characteristic features of Godley's stock-flow models, though it differs from Godley's standard approach in some respects. The accounting relations among flow variables are summarized in Table 1. We present this transaction matrix in a Social Accounting Matrix form to keep consistency with more complex tables we shall present onwards. As usual, payments are reported in columns, rows register receipts, and row and column totals always add up. The first column is devoted to production costs, and the first row to production receipts, even though such column may not be strictly necessary since the model only deals with one good.

[table 1 here]

[table 2 here]

The structure of stock, flows and stock-flow accounting is rather standard when compared to other Godley's stock-flow models with no government and no external sector. We refer the reader to G&L paper for a detailed description of the accounts, should it not be self explanatory from the tables above. Given the simple outline of the economy, the only assumption is that banks do not make profits, and thus do not cumulate wealth: this imply that the stock of loans will equal the stock of (credit) money, and that interest rates on money and loans be the same[2].

[2] It should be stressed that equality between loans and deposits does not emerge as a matter of accounting identities, but rather as a consequence of portfolio decisions and budget constraints: the key behavioral assumptions are that banks finance whatever amount firms need to pay for investment decisions which is not covered by retained profits or sales of new equities, and money holdings from households is determined as a residual from expenditure decisions based on expected income.

When we turn to the behavioral assumptions of the G&L model, however, we note several differences with previous Godley's empirical work. For instance, the investment function proposed by G&L is

$$1)\quad g = I/K_{t-1} = \gamma_0 + \gamma_1 \cdot rcf - \gamma_2 \cdot lev + \gamma_3 \cdot q + \gamma_4 \cdot u$$

where *rcf* is the rate of cash flow (retained earnings to capital), *lev* is the leverage ratio (debt to capital), *q* is Tobin's q ratio[3] and *u* is the rate of capacity utilization[4].

This investment function is rather new with respect to several models previously published by Godley. Indeed, it seems Godley has shown little interest for the determination of long-term growth: in his work with Cripps, for instance, there is hardly any mention of how investment decisions are taken, and how the components of final expenditure are individually determined. In their very simple model with inventory accumulation – which seems to be determined by the same motivation which drive investment, eg an expected increase in sales, we find:

> "There is little point in formulating mechanical rules to determine [the growth rate of inventories] … Inventory accumulation must by itself be an act of faith, prompted by anticipations of future sales which will hardly ever be fulfilled precisely. These anticipations are the one basic driving force of the very simple model examined so far. They may be influenced not only by what has actually been happening to sales but also by monetary policy … and in a more realistic model by … fiscal decisions and external trade"[5]

It is therefore interesting to see how the introduction of the investment equation in G&L model would change the overall approach to modeling a closed economy.

What is equation (1) saying about the sources of capital accumulation, and hence growth? First, some minor comments on how equation (1) is laid down seem necessary. It is conceivable to assume that Tobin's q fluctuates or converges to a "normal", positive, value[6], and the same applies to the utilization rate u. Assuming for the time being a "normal" leverage ratio (possibly zero), equation (1) should be written as

$$1a)\quad g = \gamma'_0 + \gamma_1 \cdot rcf + \gamma_3 \cdot (q - q^*) + \gamma_4 \cdot (u - u^*)$$

$$1a')\quad g = (\gamma'_0 - \gamma_3 \cdot q^* - \gamma_4 \cdot u^*) + \gamma_1 \cdot rcf + \gamma_3 \cdot q + \gamma_4 \cdot u$$

where q*, u* are "normal" values. Therefore, if there is no exogenous trend in capital accumulation ($\gamma'_0=0$), we should expect a negative value for γ_0 in empirical estimates of equation (1), which can be interpreted as implicit estimates for the "normal" values of q, u.

If there is no exogenous trend in g, and q, u are close to their "normal" values, only profits are, endogenously, a source for growth.

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[3] Measured as the ratio between the amount of finance receveid by firms to capital, where the stock of finance is given by the stock of debt plus the current value of equities.

[4] All explanatory variables are lagged one period in G&L model.

[5] Godley – Cripps (1983), p. 97.

[6] Even though G&L stress that the model does not impose q to be equal to unity, not even in the long run.

We therefore played some experiments based on the G&L model to check how growth was affected by the assumed trend in investment. We started from the values[7] chosen by G&L as their "normal" scenario: these imply a steady growth in the baseline solution of approximately 5.4%, with a trend in the investment equation of 2.75%.

We successively reduced the trend in the investment equation to the level which should be compatible with the absence of exogenous growth, but as exogenous growth approaches its implied null value, the model fails to solve[8]. This feature may derive from the fact that the exogenous growth rate in investment is one of the few exogenous variables in G&L model – along with the interest rate on money and the desidered share of equities to wealth – so that if this trend is set to zero the model is indetermined.

With a (positive) value for exogenous growth the model still retain its characteristics of having a steady growth value which is a multiple of the assumed exogenous trend. This is due to the inter-relation between the profit rate and the growth rate. For instance, a permanent shock of .25% to the exogenous growth rate leads to a permanent increase in the growth rate of .55%, and an increase in the utilization rate of .07%.

What about the major engine of growth in neoclassical models, eg increases in productivity? G&L formulation is not appropriate to analyze these kinds of shock, partly because of the assumption of a fixed mark-up. If we assume that any increase in productivity is transferred to wages, so that both prices and the distribution of income remain constant, a change in productivity will only affect the level of employment, which will decline proportionately without any effect on aggregate demand. But, if we assume that a shock to productivity affects the utilization rate, is to say that not only labor but also (new) capital gets more productive, there will be a decline in the utilization rate, which will discourage investment leading to a deceleration in the rate of growth. If we assume that the increase in productivity is captured by an increase in the mark-up on unit costs, leading to a decrease in the share of wages on output, then again – as G&L point out - the model predicts that growth will decrease in the long run, since the negative impact on consumption from the fall in the share of wages will prevail over the positive impact on investment given by the increase in the rate of profit.

These effects may be reversed when we move to a model of the open economy, since an increase in productivity may increase competiteveness, attracting foreign demand on a scale which may compensate for the negative effects incorporated in the model for the closed economy.

[7] I thank Wynne Godley for providing all the necessary values to replicate the model.

[8] Our inability to solve the model for low values of the exogenous trend in growth may of course derive from a poor choice of other parameters or starting values for the simulation, even though we gave considerable attention to align starting values appropriately.

While G&L model yields considerable insights for studying the dynamic characteristics of a growing monetary economy, it seems to be still open for integration as far as the primary sources for growth are concerned, which are mainly treated in other – more standard – keynesian models of growth, ie world demand or public expenditure. Once initial growth is somehow obtained, we believe that G&L way of modeling the interrelation among firms, banks and households is a very promising starting point to evaluate the consistency of different theories, which can be pinned down to specific value for the parameters of interest in the behavioral functions. The model may also prove to be a promising starting point for assuming a different behavior for the banking sector, which here is simply accomodating the demand for finance from firms, but may have a strong (negative) influence on growth should it turn to some mechanism of credit rationing.

3. A note on stock-flow norms in G&L model

Most of Godley's work has been based on the assumption of stable stock-flow norms, which may be considered as the underlying exogenous determinants of the economy's path toward steady-state. The simpler example can be derived by a consumption function such as

2) $C_t = \alpha \cdot Y_t + \beta \cdot V_{t-1}$

where C is consumption, Y is income and V is the stock of wealth. In an extremely simple model wealth cumulates according to

3) $\Delta V_t = Y_t - C_t$

substituting (2) into (3) we obtain

4) $V/Y = [(1 - \alpha) \cdot (1 + gy)]/(\beta + gv)$

where gy, gv are growth rates for Y, V, respectively. In steady state gy = gv = 0, and (4) reduces to

4a) $V/Y = (1 - \alpha)/\beta$

In a growing economy, however, a stable stock-flow ratio V/Y implies gv=gy, so that equation (4) may be used to determine the growth rate in the economy, ***given*** a stable ratio between wealth and income. This is what Godley and Cripps do for the simple model of a closed economy with inventories. But if growth is exogenously determined by forces outside the model, such as firms' expectations about future profits, government intervention and world demand, then equations like (4) cannot be inverted to determine growth rates, but rather prove that – ***if the economy reaches a steady growth path*** – stock flow norms will be stable. Or, to put it differently, any model which wishes to explore growth should have a system of accounts which ensures that stock-flow norms are stable on the steady growth solution.

4. Integrating the public sector: an extension of G&L model

To examine further the characteristics of G&L type models, we have enlarged it to incorporate the public sector. We start fro some simple assumptions: government deficit is defined as

5) $GD = G – (DT + NIT + TF +T0) = \Delta Bs$

where G is government expenditure, DT taxes on wages, NIT net taxes on sales, FT taxes on gross profits, T0 other net transfers and ΔB the corresponding increase in government debt. We assume fixed tax rates for DT, NIT and TF, and assume further that G, T0 grow in line with previous period growth in the economy. Any government deficit is assumed to be financed by issuing bonds at a given interest rate.

The corresponding balance sheets and SAM are reported in Table 3 and 4, respectively. We assume that banks acquire any amount of government bonds which is not purchased by households, while all interest payments banks receive from the public sector are transferred to the private sector, so to maintain the hypothesis of null saving for the financial sector.

[table 3 here]

[table 4 here]

Of course, this is a very crude assumption, and we would rather prefer to have some adjustment mechanism which guarantees that the demand for bonds matches supply, so that the interest rate on bonds is endogenized. At this stage, however, we have not been able to find a set of parameters which would yield stable results with an endogenous interest rate.

We therefore extend G&L set of Tobinesque equations describing demand for assets as

6) $pe^*Ed/V^* = \lambda_{10} – \lambda_{11}\ rm + \lambda_{12}\ re(-1) - \lambda_{13}\ rb – \lambda_{14}\ Ye/Ve$

7) $Bh^*/V^* = \lambda_{20} – \lambda_{21}\ rm – \lambda_{22}\ re(-1) + \lambda_{23}\ rb – \lambda_{24}\ Ye/Ve$

8) $Md^*/V^* = \lambda_{30} + \lambda_{31}\ rm – \lambda_{32}\ re(-1) – \lambda_{33}\ rb + \lambda_{34}\ Ye/Ve$

where the first column of parameters sum to one, while the other columns sum to zero.

Given our assumptions, it is relatively straightforward to obtain a new stable baseline solution for the model. In particular, assuming that government expenditure grows along with the economy guarantees that the share of expenditure converge to stable values, and that all relevant stock-flow norms are stable, with the economy growing at a rate given by a multiple of the exogenous trend growth in the investment equation.

Having found a stable baseline solution, we replicated some experiments conducted by G&L, obtaining comparable results (not reported here). We also checked the effects on the model of a temporary increase in government expenditure: we allowed G to grow 1% faster for 1 year, and compared results with the baseline.

Chart 1 shows the results for growth, the profit rate and the utilization rate, as a ratio to the baseline values. Since growth in government expenditure goes back to the (previous period) growth rate in the economy, the shock to government expenditure growth has a permanent effect. Government debt grows, and then stabilizes as a share of output[9].

Of course, the model presented here is still in a very preliminary stage of development, but we hope it may help to show how to proceed on more complex theoretical stock-flow models.

5. The structure of the Levy macroeconomic model

The Levy macroeconomic model has been developed following the same methodological approach of the G&L model, at least as far as the accounting is concerned, but with a completely different purpose: the ability of laying down the constraints on possible growth paths for the US economy in the medium term.

We can compare it to the previous models by laying down its stock and stock-flow accounting[10]. The economy is divided in a public sector, a financial sector and a private non-financial sector including both households and non financial businesses. There is no accounting for real assets at this stage.

[table 5 here]

Banks finance production by issuing loans, and thereby creating money, or acquire government bonds, thus financing public expenditure. A standard assumption is that banks saving are zero, ie banks distribute profits entirely. Firms can get additional finance from retained profits, or by issuing equities: equities held by households net out in the aggregate, so that only equities held by foreigners enter into the net stock of financial assets of the private sector[11].

[table 6 here]

Flow accounting may be laid down with a Social Accounting Matrix, where as usual payments from a given sector are represented in columns, and rows capture receipts. Receipts and expenditure related to the production process are represented in an additional column, and row and column totals are equal.

[9] We ran the same simulation assuming that a permanent increase in the interest rate on bonds would be required to finance the increase in government expenditure: the results are qualitatively similar, but the increase in interest payments generating from the higher government debt and a higher interest rate further stimulate growth.

[10] The model as presented here is a modified version of that in use at the Levy Institute of Economics: we assume here that a single commodity is produced, with a price of one, and that there is no inflation, thereby eliminating the need for relative prices, inflation accounting and distinctions between nominal and real variables.

[11] By assumption the financial sector does not issue, nor acquires equities. Even though equities held by households do not change the stock of net assets held by the private sector, changes in the market value of equities can affect private sector behavior: an increase in stock market prices, for instance, will reduce households propensity to save out of income, even though sales of (higher priced) equities to other components of the private sector will only change the distribution of wealth, with no net effect on net aggregate income or wealth.

Column (1) represent production costs plus profits, as the sum of expenditure on intermediate goods IG, profits earned by the non financial (ΠP) and the financial sector (ΠB), net indirect taxes (NIT) and imports (IM). They are equal to the value of sales plus the increase in inventories, given by the first row total as the sum of IG, consumption (C), government expenditure (G), exports (EX), fixed investment (I) and the change in inventories (DPI).

Thus

1) $X = IG + C + G + EX + I + DPI = IG + WB + \Pi P + \Pi B + NIT + IM$

Given the conventional definition of GDP as

2) $GDP = C + G + EX + I + DPI - IM$

equation (1) implies

1a) $GDP = C + G + EX + I + DPI - IM = WB + \Pi P + \Pi B + NIT$

Comparing receipts and payments of the private non financial sector, given by row and column (2), we obtain savings Sp from

3) $Sp = WB + (\Pi P + \Pi Bd - \Pi Pw) + (Rd\ D(-1) + Rb\ Bp(-1) + Rf\ F(-1) - Rl\ L(-1)) + TRGP - DT - T\Pi - C$

while comparisons of row and column (3) for the financial sector yield, given the assumption that all (after tax) profits are distributed

4) $\Pi B + Rl\ L(-1) + Rb\ Bb(-1) = \Pi Bd + Rd\ D(-1) + T\Pi$

from which we may derive undistributed profits as

4a) $\Pi Bd = \Pi B + Rl\ L(-1) + Rb\ Bb(-1) - Rd\ D(-1) - T\Pi$

which, substituted into eq. 3, yields

5) $Sp = WB + (\Pi P + Rl\ L(-1) + Rb\ Bb(-1) - Rd\ D(-1) - T\Pi - \Pi Pw) + (Rd\ D(-1) + Rb\ Bp(-1) + Rf\ F(-1) - Rl\ L(-1)) + TRGP - DT - T\Pi - C$

simplifying and using the rhs definition of GDP in eq. 1a

5a) $Sp = GDP - NIT - T\Pi b - \Pi Pw + Rb\ (Bp(-1)+Bb(-1)) + Rf\ F(-1) + TRGP - DT - T\Pi - C$

Comparing totals for row and column (4) we obtain the definition of government surplus Sg

6) $Sg = NIT + DT + T\Pi + T\Pi b - G - Rb\ B(-1) - TRGP$

and row and column (5) yield the balance of payments

7) $BP = -Sw = EX + Rf\ F(-1) - IM - \Pi Pb - Rb\ Bw(-1)$

as a matter of accounting, the last row and column total must add up, or

8) $Sp + Sg - BP = I + DPI$

is implied by equations (1-7).

A central feature of Godley-type models is that Net Acquisition of Financial Assets (NAFA) by the private sector is stable with respect to GDP. Thus, turning government savings Sg into government deficit GD, from (8) NAFA can be defined as

9) $NAFA = Sp - (I+DPI) = Bp + GD$

A stable ratio of NAFA to GDP requires the sum of the balance of payments and government deficit to be stable. This can be achieved only if both balances are stable, or if they are moving in opposite directions – say a growing balance of payments deficit as a share of GDP coexists with a growing government deficit. The latter case will put the economy on an unsustainable path, since the need to finance the imbalances implies a growing foreign and public debt, with interest payments cumulating to accelerate the imbalances. Eventually, a rising debt to GDP ratio will increase the risk of debt default, thereby increasing interest rates, further accelerating the burden of interest payments.

In this representation of the economy we do not need to distinguish between households and non-financial firms, and the model is entirely driven by growth in exogenous variables – such as government expenditure and world demand – with behavioral equations being based on stable stock-flow norms.

Our previous discussion on the relationship between the stability of stock-flow norms and a stable growth path for the economy is now illustrative for the usefullness of such models in tracking a real economy.

For instance, visual inspection of the balances in equation 9 for the US economy, given in chart 2, shows a relative stability of NAFA as a share of GDP from 1960 to 1996, while this ratio is declining in the last part of the sample. Stability of such ratio is confirmed by tests for stationarity, which reject the hypothesis of unit roots up to 1996, but fail to do so when the data for the second half of the 90s are included in the sample.

Appendix – A stock-flow model with the public sector

A1) Y = W + FD + rm * Md(-1) + rb * B(-1) - DT - T0
A2) FU = FT - FD - rl * Ld(-1) - TF
A3) Ld = Ld(-1) + I - FU - (es - es(-1)) * pe
A4) V = V(-1) + Y - CONS + (pe - pe(-1)) * ed(-1)
A5) gr = gr0 + gr1 * FU(-1) * ret / K(-1) - gr2 * rl(-1) * m(-1) + gr3 * (q(-1) - 1) + gr4 * u(-1)
A6) Md^ = Ve - pe * ed - bh
A7) Md = Md^
A8) Ve = V(-1) + Ye + (pe - pe(-1)) * ed(-1) - Cons
A9) Cons = (a1) * y + a1 * CG(-1) / gam1 + a2 * v(-1)
A10) Ye = (1 + gr(-1)) * Y(-1)
A11) pe = Ve * (lam01 - lam1 * rm + lam2 * re(-1) - lam3 * Ye / Ve - lam4 * rb) / ed
A12) bh = Ve * (lamb01 - lamb1 * rm - lamb2 * re(-1) - lamb3 * Ye / Ve + lamb4 * rb)
A13) Es = Es(-1) + (x * I) / pe
A14) W = wage * N
A15) FT = ro * W
A16) I = (K - I(-1))
A17) K = (1 + gr) * K(-1)
A18) S = Cons + I + G
A19) re = (FD + CG) / (Ed(-1) * pe(-1))
A20) FD = (1 - ret) * ((1 - tfrate) * FT(-1) - rl(-1) * Ld(-2)) * (1 + gr(-1))
A21) rm = rl
A22) Ed = Es
A23) Ls = Ld
A24) Ms = Ls
A25) CG = (pe - pe(-1)) * Es(-1)
A26) m = Ld / K
A27) q = (pe * Ed + Ld) / K
A28) SFC = lambda * k
A29) u = S / SFC
A30) GD = G + rb * B(-1) - DT - NIT - TF – T0
A31) B = B(-1) + GD
A32) DT = dtrate * W
A33) NIT = tau * S
A34) TF = tfrate * FT
A35) N = S / prod
A36) g = g(-1) * (1 + gr(-1))
A37) T0 = T0(-1) * (1 + gr(-1))
A38) BB = B - Bh

B	Stock of government bonds
Bh	Government bonds held by households
Bb	Government bonds held by banks
CG	Capital gains on equities
Cons	Consumption
DT	Taxes on wages
Ed	Demand for equities
Es	Supply of equities
Fd	Distributed profits
Ft	Total profits
Fu	Undistributed profits
G	Government expenditure
GD	Government deficit
gr	accumulation rate
I	Investment

K	Stock of fixed capital
Ld	Demand for loans
Ls	Supply of loans
Md	Demand for money
Ms	Supply of money
Md^	Desired demand for money
Ms	Supply of money
N	Employment
NIT	Net Indirect taxes
Pe	Price of equities
prod	productivity
q	Tobin's q ratio
rb	Interest rate on bonds
re	Rate of return on equities
rl	Interest rate on loans
rm	Interest rate on money
ro	mark-up on unit costs
S	final expenditure
SFC	"full capacity" final expenditure
T0	net transfers to government
TF	Taxes on profits
u	utilization rate
V	stock of wealth
Ve	expected stock of wealth
W	wages
wage	unit wage
Y	household income
Ye	expected household income

Tables and charts

Table 1. G&L model Social Accounting Matrix						
	Production	Households	Firms	Banks	Capital Account	Total
Production	IG	C			I	X
Households	WB		Fd	r M		Yh
Firms	F					F
Banks			r L			Yb
Capital account		Sh	Fu	0		S
Total	X	Yh	F	Yb	I	

Table 2. G&L model Balance sheets				
	Households	Firms	Banks	Total
Money	+M		-M	0
Loans		-L	+L	0
Capital		+K		+K
Equities	+E pe	-E pe		0
Total (net worth)	+ V	K – (L + E pe)	0	+K

Table 3. Extended G&L model Social Accounting Matrix							
	Production	Households	Firms	Banks	Government	Capital Account	Total
Production	IG	C			G	I	X
Households	WB		Fd	r M + rb Bb	rb Bh		Yh
Firms	F						F
Banks			r L		rb Bb		Yb
Government	NIT	DT+T0	TF				Yg
Capital account		Sh	Fu	0	Sg		S
Total	X	Yh	F	Yb	Yg	I	

Table 4. Extended G&L model Balance sheets					
	Households	Firms	Banks	Government	Total
Money	+M		-M		0
Loans		-L	+L		0
Bonds	+Bh		+Bb	-B	0
Capital		+K			+K
Equities	+E pe	-E pe			0
Total (net worth)	+ V	K – (L + E pe)	+Bb	-B	+K

Table 5. Levy model. Balance sheets					
	Private non Financial sector	Financial Sector	Government	Rest of The World	Total
Money	+DEP	-DEP			0
Loans	-L	+L			0
Bonds	+Bp	+Bb	-B	+Bw	0
Equities	-pe EQw			+ pe EQw	0
Foreign assets	+F			-F	0
Total	NFA	-M	-GD	-FA	0

Table 6. Levy model Social Accounting Matrix							
	Production (1)	Private non Financial S. (2)	Financial Sector (3)	Government (4)	Rest of The World (5)	Capital Account (6)	Total
(1) Production	IG	C		G	EX	I+DPI	X
(2) Private non Financial s.	WB+ ΠP	WB+ ΠPd	ΠBd+ Rd D(-1)	TRGP+ Rb Bp(-1)	Rf F(-1)		Yp
(3) Financial Sector	ΠB	Rl L(-1)		Rb Bb(-1)			Yb
(4) Government	NIT	DT+TΠ	TΠb				Yg
(5) Rest of the World	IM	ΠPw		Rb Bw(-1)			Yw
(6) Capital acc.		Sp	0	Sg	Sw		S
Total	X	Yp	Yb	Yg	Yw	I+DPI	

Chart 1 **A shock to government expenditure**

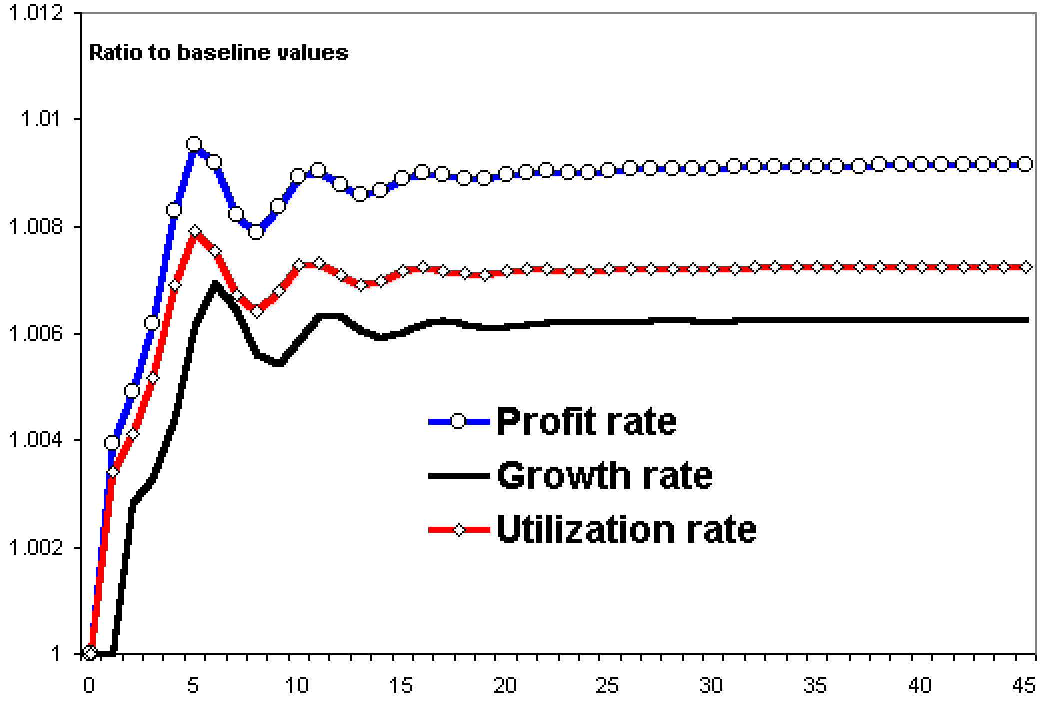

Chart 2 **United States. Major sectors balances**