

Monetary Economics

An Integrated Approach to Credit,
Money, Income, Production and Wealth

Second Edition

Wynne Godley and Marc Lavoie



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Money, Income, and Wealth



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Notations Used in the Book

A_d	Advances demanded by private banks
A, A_s	Central bank advances made to private banks
add	Random change in liquidity preference
add_{bL}	Spread of bond rate over the bill rate
add_1	Spread of bill rate over the deposit rate
add_2	Random change in government expenditures
AF	Amortization funds
$B_{\pounds}^{\$}$	Bills held by \pounds households but issued by the $\$$ country
$B_{\$}^{\pounds}$	Bills held by $\$$ households but issued by the \pounds country
$B_{cb\pounds}^{\$}$	Bills held by the \pounds central bank but issued by the $\$$ country (foreign reserves of country \pounds)
$B_{cb\$}^{\$}$	Bills held by $\$$ central bank and issued by the $\$$ country
$B_{cb\pounds}^{\pounds}$	Bills held by the \pounds central bank and issued by the \pounds country
B_d, B_{hd}	Bills demanded by households (ex ante)
B_b, B_{bd}	Bills actually demanded by banks
B_{bdN}	Bills notionally demanded by banks
B_{cb}	Bills held by the central bank
B_h, B_{hh}	Bills held by households
B_s	Treasury bills supplied by government
$bandB, bandT$	Lower and upper range of the flat Phillips curve
BL_d	Long-term bonds demanded by households
BL_h	Long-term bonds held by households
BL_s	Long-term bonds issued by government
BLR	Bank liquidity ratio, actual or gross value
BLR_N	Bank liquidity ratio, net of advances
$BLPR$	Banks liquidity pressure ratio
bot	Bottom of an acceptable range
$botpm$	Bottom of the acceptable range of the profitability margin of banks

<i>BP</i>	Balance of payments
<i>BPM</i>	Bank profit margin
<i>BUR</i>	Relative burden of interest payments on loans taken by households
c, c_d	Consumption goods demand by households, in real terms
C_d	Consumption goods demand by households, in nominal terms
C, C_s	Consumption goods supply by firms, in nominal terms
<i>CAB</i>	Current account balance
<i>CAR</i>	Realized capital adequacy ratio of banks
<i>CF</i>	Cash flow of firms
<i>CG</i>	Capital gains
CG^e	Expected capital gains of the current period
<i>DA</i>	Depreciation allowance
<i>DEF</i>	Government deficit
<i>DS</i>	Nominal domestic sales
ds	Real domestic sales
dxr_e	Expected change in the exchange rate
E, E_f, E_b	Value of equities, issued by firms, issued by banks
e_b	Number of equities supplied by banks
e_d	Number of firms' equities demanded by households
e_s, e_f	Number of equities supplied by firms
<i>ER</i>	Employment rate (the complement of the unemployment rate)
ERr_{bL}	Expected rate of return on long-term bonds
<i>F</i>	Sum of bank and firm profits
F, F_f	Realized entrepreneurial profits of production firms
F_b	Realized profits of banks
F_b^T	Target profits of banks
F_{cb}	Profits of central bank
F^e	Expected entrepreneurial profits of firms
F_f	Realized entrepreneurial profits of production firms
F_f^e	Expected profits of firms
F_f^T	Target entrepreneurial profits of production firms
F_T	Total profits of firms, inclusive of interest payments on inventories
F_{nipa}	Profits, as measured by national accountants
<i>FD</i>	Business dividends

FD_b	Dividends of banks
FD_f	Realized dividends of production firms
FU	Business retained earnings
FU_b	Retained earnings of banks
FU_b^T	Target retained earnings of banks
FU_f	Realized retained earnings of production firms
FU_f^T	Target retained earnings of production firms
fs	Real fiscal stance
g	Pure government expenditures in real terms
g'	Real total government expenditures (inflation accounted)
G	Pure government expenditures in nominal terms
G_s, G_d	Services supplied to and demanded by government
G_{NT}	Total government expenditures, including interest payments net of taxes
gd	Real government debt
G_T	Total government expenditures, inclusive of interest payments on debt
G_{TD}	Total <i>domestic</i> government expenditures
GD	Government debt (public debt), in nominal terms
GL	Gross flow of new loans made to the household sector
gr	Steady-state growth rate of the economy
gr_k	Growth rate of net capital accumulation
gr_g	Growth rate of real pure government expenditures
gr_{pr}	Growth rate of trend labour productivity
H_{bd}	Reserves demanded by banks
H_b, H_{bs}	Reserves supplied to banks by the central bank
H_d, H_{hd}	Cash money demanded by households
H_d, H_h, H_{hh}	Cash money held by households
H_g	Cash money held by government
H_{hs}	Cash money supplied to households by the central bank
H, H_s	High-powered money, or cash money, supplied by the central bank
HC	Historic costs
HC^e	Expected historic costs
HUC	Historic unit cost
HUC^e	Expected historic unit cost
HWC	Historic wage cost

i_d	New fixed capital goods demanded by firms (investment flow), in real terms
I_d	New fixed capital goods demanded by firms (investment flow), in nominal terms
I_h	Residential investment of households
I_s, I, I_f	New fixed capital goods supplied by firms, in nominal terms
in	Realized stock of inventories, in real terms
in^e	Short-run target level (expected level) of inventories, in real terms
in^T	Long-run target level of inventories, in real terms
IN	Realized stock of inventories, at current unit costs
im	Real imports
IM	Imports, in nominal terms
IM_T	Total imports, inclusive of interest payments made abroad
INT_b	Interest payments paid by banks
INT_f	Interest payments paid by firms
INT_h	Interest payments received by households
k, k_f, k_b	Fixed capital stock, in real terms (number of machines), of firms, of banks
K, K_f, K_b, K_h	Value of fixed capital stock, in nominal terms, of firms, of banks, of households
K^T	Targeted capital stock
$KABOSA$	Capital account balance, inclusive of the official settlements account
KAB	Capital account balance, excluding official transactions
L_d, L_{fd}	Loans demanded by firms from banks
L, L_s, L_{fs}, L_f	Loans supplied by banks to firms
L_g	Loans to government sector
L_{hd}	Loans demanded by households from banks
L_{hs}, L_h	Loans supplied by banks to households
M, M_h, M_{hh}	Money deposits actually held by households
$M1, M1_h$	Checking account money deposits held by households

$M1_d$	Checking account money deposits demanded
$M1_s$	Checking account money deposits supplied
$M2, M2_h$	Time or term money deposits held by households
$M2_d$	Time or term money deposits demanded
$M2_s$	Time or term money deposits supplied
$M1_{hn}$	The notional amount of bank checking account deposits that households would hold
M_d, M_{hd}	Money deposits demanded by households
M_f	Financial assets of firms
M_g	Bank deposits of government
m_h	Real money balances held by households
M_s	Money supplied by the government (ch. 3) or the banks
ML	Mean lag
N, N_d	Demand for labour
N_{fe}	The full-employment labour force
N_s^e	Expected supply of labour
N_s	Supply of labour
N^T	Target level of employment by firms
$NAFA$	Net accumulation of financial assets by the household sector (financial saving)
$NCAR$	Normal capital adequacy ratio of banks (Cooke ratio)
$NHUC$	Normal historic unit cost
NL	Net flow of new loans made to the household sector
nl	Real amount of new personal loans
npl	Proportion of non-performing loans
npl^e	Expected proportion of non-performing loans
NPL	Amount of non-performing loans (defaulting loans of firms)
NUC	Normal unit costs
$NW, NW_h, NW_f,$ NW_g, NW_b	Net worth (of households, firms, government, banks)
<i>or</i>	Gold units
OF_b	Own funds (equity capital) of banks
OF_b^e	Short-run own funds target of banks
OF_b^T	Long-run own funds target of banks

p	Price level
p_{bL}	Price of long-term bonds (perpetuities)
p_{bL}^e	Expected price of long-term bonds in the next period
p_{ds}	Price index of domestic sales
p_e, p_{ef}	Price of firms' equities
p_{eb}	Price of banks' equities
p_g	Price of gold
p_k	Price of fixed capital goods
p_m	Price index of imports
p_s	Price index of sales
p_x	Price index of exports
p_y	GDP deflator
PE	Price-earnings ratio
PER_{bL}	Pure expected rate of return on long-term bonds
pr	Labour productivity, or trend labour productivity
$PSBR$	Public sector borrowing requirement (government deficit)
q	The valuation ratio of firms (Tobin's q ratio)
REP	Repayment by household borrowers (payment on principal)
r, r_b	Rate of interest on bills
r, r^e	Actual and expected yield on perpetuities (Appendix 5.2)
r_a	Rate of interest on central bank advances
r_{bL}	Yield on long-term bonds
r_k	Dividend yield
r_l	Rate of interest on bank loans
r_{lN}	Normal rate of interest on bank loans that firms use to set the markup
r_m	Rate of interest on deposits
rr_b	Real rate of interest on bills
rr_b^T	Target real bill rate
Rr_{bl}	Rate of return on bonds
rr_{bL}	Real yield on long-term bonds
rr_c	Real rate of interest on bank loans, deflated by the cost of inventories index
rr_l	Real rate of interest on bank loans
rr_m	Real rate of interest on term deposits

\tilde{r}	Average rate of interest payable on overall government debt
R_a	Random number modifying expectations
s	Realized real sales (in widgets)
s^e	Expected real sales
S	Sales in nominal terms
S^e	Expected sales in nominal terms
SA	Stock appreciation (inventory valuation adjustment IVA)
$SAV_h, SAV_f,$ SAV_g, SAV	Household, business, government, and overall saving
T	Taxes
T_h	Income taxes of households
T_f	Indirect taxes on firms
T_d	Taxes demanded by government
T_s, T_s^e	Taxes supplied or expected to be supplied
top	Top of a target range
$toppm$	Top of a target range of bank profitability
TP	Target proportion of bonds in national debt held by households
UC	Unit cost of production
ν	Wealth of households in real terms
V, V_h	Wealth of households, in nominal terms
V^T	Target level of household wealth
V^e	Expected wealth of households, in nominal terms
V_f	Wealth of firms, in nominal terms
V_{fma}	Wealth of households devoted to financial market assets
V_g	Wealth of government, in nominal terms
V_{nc}	Wealth of households, net of cash
V_{nc}^e	Expected wealth of households, net of cash
W	Nominal wage rate
WB	The wage bill, in nominal terms
wb	Real wage bill
x	Real exports
X	Exports in nominal terms
X_T	Total exports, inclusive of interest payments received from abroad

xr	Exchange rate
$xr^{\$}$	Dollar exchange rate: value of one dollar expressed in pounds
xr^{\pounds}	Sterling exchange rate: value of one pound sterling expressed in dollars
xr_e	Expected level of the future exchange rate
Y	National income, in nominal terms
Y_{fc}	Full-capacity output
Y_T	National income plus government debt service
YD	Disposable income of households
YD^e	Expected disposable income
YD_{hs}	Haig-Simons nominal disposable income (including all capital gains)
YD_r	Regular disposable income
YD_r^e	Expected regular disposable income
YP	Nominal personal income
y	Real output
yd	Deflated regular income
yd_{hs}	Haig-Simons realised real disposable income
yd^e	Expected real disposable income
yd_{hse}	Haig-Simons expected real disposable income
yd_r	Realized real regular disposable income
yd_r^e	Expected real regular disposable income
z	Dichotomic variable or some numerical parameter
zm	Proportional response of the money deposit rate following a change in the bill rate

Greek Letters

α	(alpha)	Consumption parameters
α_0		Autonomous consumption
α_1		P propensity to consume out of regular income
α_2		P propensity to consume out of past wealth
α_3		Implicit target wealth to disposable income ratio of households
α_4		Long-run government debt to GDP ratio
β	(beta)	Reaction parameter related to expectations
γ	(gamma)	Partial adjustment function that applies to inventories and fixed capital
δ	(delta)	Rate of depreciation on fixed capital
δ_{rep}		Rate of amortization on personal loans
ε	(epsilon)	Another reaction parameter related to expectations Export parameter of a country

ζ	(zeta)	Reaction parameter related to changes in interest rates
η	(eta)	New loans to personal income ratio
θ	(theta)	Personal income tax rate
θ'		Taxes to GDP ratio
ι	(iota)	Parameter tied to the impact of interest rates on the propensity to consume
κ	(kappa)	Target fixed capital to output ratio
λ	(lambda)	Reaction parameters in the portfolio choice of households
λ_C		Cash to consumption ratio
μ	(mu)	Import propensity or parameter
ν	(nu)	Parameter tied to import prices
ξ	(xi)	Reaction parameter tied to changes in interest rates
\omicron	(omicron)	
π	(pi)	Price inflation rate
π_C		Inflation rate of unit costs
ρ	(ro)	Compulsory reserve ratios on bank deposits
σ	(sigma)	Various measures of inventories to output (or sales) ratio
σ_S		Realized (past period) inventories to sales ratio
σ_{se}		Expected (past period) inventories to sales ratio
σ^N		Normal (past period) inventories to sales ratio
σ^T		Target (current) inventories to sales ratio
τ	(tau)	Sales tax rate
υ	(upsilon)	Parameter tied to export prices
φ	(phi)	Costing margin in pricing
φ^T		Ideal costing margin
$\varphi'/(1 + \varphi')$		Realized share of entrepreneurial profits in sales
χ	(chi)	Weight of conviction in expected bond prices
ψ	(psi)	Target retained earnings to lagged investment ratio
ω	(omega)	Real wage rate
ω^T		Real wage target
Ω	(OMEGA)	Reaction parameters related to real wage targeting
π	(hebrew letter)	$\pi = \Delta p/p$ (nearly price inflation, but not quite)
\$		dollar
£		pound sterling

Preface

The premises underlying this book are, first, that modern industrial economies have a complex institutional structure comprising production firms, banks, governments and households and, second, that the evolution of economies through time is dependent on the way in which these institutions take decisions and interact with one another. Our aspiration is to introduce a new way in which an understanding can be gained as to how these very complicated systems work *as a whole*.

Our method is rooted in the fact that every transaction by one sector implies an equivalent transaction by another sector (every purchase implies a sale), while every financial balance (the difference between a sector's income and its outlays) must give rise to an equivalent change in the sum of its balance-sheet (or stock) variables, with every financial asset owned by one sector having a counterpart liability owed by some other. Provided all the sectoral transactions are fully articulated so that 'everything comes from somewhere and everything goes somewhere' such an arrangement of concepts will describe the activities and evolution of the whole economic system, with all financial transactions (including changes in the money supply) fully integrated, at the level of accounting, into the processes which generate factor income, expenditure and production.

As any model which includes the whole range of economic activities described in the national income and flow-of-funds accounts must be extremely complicated, we start off by imagining economies which have unrealistically simplified institutions, and explore how these would work. Then, in stages, we add more and more realistic features until, by the end, the economies we describe bear a fair resemblance to the modern economies we know. In the text we shall employ the narrative method of exposition which Keynes and his followers used, trying to infuse with intuition our conclusions about how particular mechanisms (say the consumption or asset demand functions) work, one at a time, and how they relate to other parts of the economic system. But our underlying method is completely different. Each of our models, before we started to write it up, was set up with its own stock and flow transactions so comprehensively articulated that, however large or small the model, the n th equation was always logically implied by the other $n - 1$ equations. The way in which the system worked as a whole was then explored via computer simulation, by first solving the model in question for its steady state and then discovering its properties by changing assumptions about exogenous variables and parameters.

The text which follows can do no more than provide a narrative supplemented with equations, but we believe that readers' understanding will be enhanced, if not transformed, if they reproduce the simulations for themselves and put each model through its paces as we go along. It should be easy to download each model complete with data and solution routine.¹

In Chapters 3–5 we present very elementary models, with drastically simplified institutional structures, which will illustrate some basic principles regarding the functioning of dynamic stock-flow consistent (SFC) models, and which incorporate the creation of 'outside' money into the income–expenditure process.

Chapter 6 introduces the open economy, which is developed seamlessly out of a model describing the evolution of two regions within a single country.

Chapters 7–9 present models with progressively more realistic features which, in particular, introduce commercial banks and discuss the role of credit and 'inside' money.

The material in Chapters 10–11 constitutes a break, in terms of complexity and reality, with everything that has gone before. We first present models which describe how inside money and outside money interact, how firms' pricing decisions determine the distribution of the national income and how the financial sector makes it possible for firms and households to operate under conditions of uncertainty. The Chapter 11 model includes a representation of growth, investment, equity finance and inflation.

Finally, in Chapter 12, we return to the open economy (always conceived as a closed system comprising two economies trading merchandise and assets with one another) and flesh-out the Chapter 6 model with additional realistic features.

It has taken many years to generate the material presented here. But we are painfully aware that this is only a beginning which leaves everything to play for.

W.G. and M.L.

Background memories (by W.G.)

My first significant memory as an economist was the moment in 1944 when P.W.S Andrews, my brilliant teacher at Oxford, got me to extrude a question from my mind: Is output determined by the intersection of marginal revenue with marginal cost curves or is it determined by aggregate demand? Thus I was vouchsafed a precocious vision of the great divide which was to obsess me for years.

¹ At <http://gennaro.zezza.it/software/evIEWS/gl2006.php>.

My apprenticeship was served in the British Treasury, where, from 1956 to 1970, I mainly worked on the conjuncture² and short-term forecasting. This was the heyday of 'stop-go' policies, when we tried to forecast what would happen during the following 18 months and then design a budget which would rectify anything likely to go wrong. Forecasting consisted of scratching together estimates of the component parts of real GDP and adding them up using, so far as we could, a crude version of the Keynesian multiplier. I now think the theoretical and operational principles we used were seriously defective, but the whole experience was instructive and extremely exciting. The main thing I derived from this work was an expertise with statistical concepts and sources while gathering a considerable knowledge of stylized facts – for instance concerning the (non) response of prices to fluctuations in demand (Godley 1959; Godley and Gillion 1965) and the response of unemployment to fluctuations in output (Godley and Shepherd 1964). I also got a lot of contemporary history burned into my mind – what kind of year 1962 was and so on – and, always waiting for the next figure to come out, I learned to think of the economy as an organism which evolves through time, with each period having similarities as well as differences from previous periods. I came to believe that advances in macro-economic theory could usefully take place only in tandem with an improved knowledge of what was actually happening in the real world – an endless process of iteration between algebra and statistics. My perspective was very much enlarged by my close friendship with Nicholas Kaldor, who worked in the Treasury from the mid-sixties. Kaldor was touched by genius and, contrary to what one might suppose, he had an open mind, being prepared to argue any question through with anyone at any time on its merits and even, very occasionally, to admit that he was wrong.

In 1970 I moved to Cambridge, where, with Francis Cripps, I founded the Cambridge Economic Policy Group (CEPG). I remember a damascene moment when, in early 1974 (after playing round with concepts devised in conversation with Nicky Kaldor and Robert Neild), I first apprehended the strategic importance of the accounting identity which says that, *measured at current prices*, the government's budget deficit less the current account deficit is equal, by definition, to private saving net of investment. Having always thought of the balance of trade as something which could only be analysed in terms of income and price elasticities together with real output movements at

² I believe myself, perhaps wrongly, to have coined this word and its variants in 1967 when I was working on devaluation. Bryan Hopkin had given me a cutting from a French newspaper describing the work of a 'conjoncturiste', adding 'This is what you are.'

home and abroad, it came as a shock to discover that if only one knows what the budget deficit and private net saving are, it follows from that information alone, without any qualification whatever, exactly what the balance of payments must be. Francis Cripps and I set out the significance of this identity as a logical framework both for modelling the economy and for the formulation of policy in the *London and Cambridge Economic Bulletin* in January 1974 (Godley and Cripps 1974). We correctly predicted that the Heath Barber boom would go bust later in the year at a time when the National Institute was in full support of government policy and the London Business School (i.e. Jim Ball and Terry Burns) were conditionally recommending further reflation! We also predicted that inflation could exceed 20% if the unfortunate threshold (wage indexation) scheme really got going interactively. This was important because it was later claimed that inflation (which eventually reached 26%) was the consequence of the previous rise in the 'money supply', while others put it down to the rising pressure of demand the previous year.

However, far more important than any predictions we then made was our suggestion that an altogether different set of principles for managing the economy should be adopted, which did not rely nearly so much on short-term forecasting. Our system of thought, dubbed 'New Cambridge' by Richard Kahn and Michael Posner (1974), turned on our view that in the medium term there were limits to the extent to which private net saving would fluctuate and hence that there was a medium-term functional relationship between private disposable income and private expenditure. Although this view encountered a storm of protest at the time it has gradually gained some acceptance and is treated as axiomatic in, for example, Garratt *et al.* (2003).

We had a bad time in the mid-1970s because we did not then understand inflation accounting, so when inflation took off in 1975, we underestimated the extent to which stocks of financial assets would rise in nominal terms. We made some bad projections which led people to conclude that New Cambridge had been confuted empirically and decisively. But this was neither correct nor fair because nobody else at that time seems to have understood inflation accounting. Our most articulate critic, perhaps, was John Bispham (1975), then editor of the *National Institute Economic Review*, who wrote an article claiming that the New Cambridge equation had 'broken down massively'. Yet the National Institute's own consumption function under-forecast the personal saving rate in 1975 by 6 percentage points of disposable income! And no lesser authority than Richard Stone (1973) made the same mistake because in his definition of real income he did not deduct the erosion, due to inflation, of the real value of household wealth. But no one concluded that the consumption function had 'broken down' terminally if at all.

It was some time before we finally got the accounting quite right. We got part of the way with Cripps and Godley (1976), which described the CEPG's

empirical model and derived analytic expressions which characterized its main properties, and which included an early version of the conflictual, 'target real wage' theory of inflation. Eventually our theoretical model was enlarged to incorporate inflation accounting and stocks as well as flows and the results were published in Godley and Cripps (1983)³ with some further refinements regarding inflation accounting in Coutts, Godley and Gudgin (1985). Through the 1970s we gave active consideration to the use of import controls to reverse the adverse trends in trade in accordance with principles set out in Godley and Cripps (1978). And around 1984 James Tobin spent a pleasant week in Cambridge (finding time to play squash and go to the opera) during which he instructed us in the theory of asset allocation, particularly Backus *et al.* (1980), which thenceforth was incorporated in our work.

In 1979 Mrs Thatcher came to power largely on the grounds that, with unemployment above one million, 'Labour [wasn't] working', and Britain was subjected to the monetarist experiment. We contested the policies and the theory underlying them with all the rhetoric we could muster, predicting that there would be an extremely severe recession with unprecedented unemployment. The full story of the Thatcher economic policies (taking the period 1979–92) has yet to be told. Certainly the average growth rate was by far the lowest and least stable of the post-war period while unemployment rose to at least four million, once the industrial workers in Wales and the North who moved from unemployment to invalidity benefit are counted in.

In 1983 the CEPG and several years of work were destroyed, and discredited in the minds of many people, by the ESRC decision to decimate our funding, which they did without paying us a site visit or engaging in any significant consultation.

Still, 'sweet are the uses of adversity', and deprived of Francis Cripps (perhaps the cleverest economist I have so far encountered) and never having touched a computer before, I was forced to spend the hours (and hours) necessary to acquire the modelling skills with which I invented prototypes of many of the models in this book.

In 1992, I was invited to join the Treasury's panel of Independent Forecasters (the 'Six Wise Men'). In my contributions I wrongly supposed that the devaluation of 1992 would be insufficient to generate export-led growth for a time. But I did steadfastly support the policies pursued by Kenneth Clarke (the UK Chancellor of the Exchequer) between 1993 and 1997 – perhaps the best time for macro-economic management during the post-war period. Unfortunately a decision was made not to make any attempt to explain,

³ A rhetorically adverse and unfair review of this book, by Maurice Peston (1983), appeared in the *Times* simultaneously with its publication.