THE GLOBAL FINANCIAL CRISIS, CREDIT CRUNCHES AND DELEVERAGING

Steve Keen

Speaking at a conference of Business Economists in December 2008, the Governor of the Reserve Bank of Australia, Glenn Stevens, remarked:

> I do not know anyone who predicted this course of events. This should give us cause to reflect on how hard a job it is to make genuinely useful forecasts. What we have seen is truly a 'tail' outcome – the kind of outcome that the routine forecasting process never predicts. But it has occurred, it has implications, and so we must reflect on it (Stevens 2008: 7).

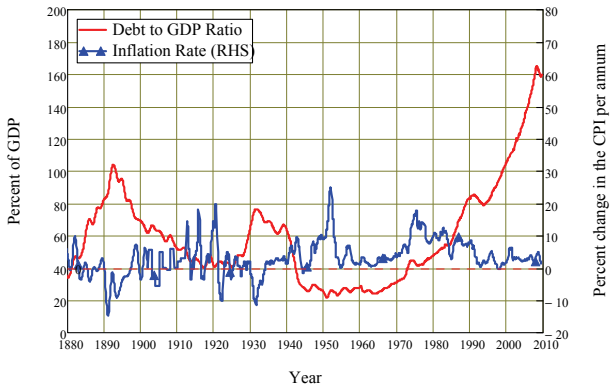
The proposition that the crisis was inherently unpredictable is a recurrent theme amongst those charged with preventing such events. It is also a convenient untruth. A Netherlands academic did a rather better survey of the literature than Governor Stevens, to identify 12 economists and market analysts who did foresee this crisis—of whom I was one (Bezemer 2009: Table 1). More importantly, he identified common elements to the analyses that led these researchers to foresee what neoclassical economists in particular failed to anticipate. Bezemer noted that though we came from varied intellectual backgrounds, we shared four common factors:

> a concern with financial assets as distinct from real-sector assets, with the credit flows that finance both forms of wealth, with the debt growth accompanying growth in financial wealth, and with the accounting relation between the financial and real economy (Bezemer 2009: 8).

My own analysis extends Hyman Minsky's 'financial instability hypothesis' (Minsky 1977; Keen 1995), using a theory of monetary dynamics known as Circuit Theory, which originated in Europe (see Graziani 2003). Both perspectives played a key role in helping identify that a crisis was imminent. Minsky emphasised the importance of the debt to GDP ratio as the key indicator of financial fragility; while the Circuit School's insights enabled the development of a purely monetary model of the economy in which changes in debt play a crucial role in determining the level of aggregate demand.

The debt to GDP ratio—which effectively shows how many years it would take to reduce debt to zero if all of GDP were devoted to debt repayment—has been in danger territory ever since the Stock Market Crash of 1987. As the long term data shown in Figure 1 reveals, Australia's debt ratio in late 1980s exceeded the deflation-driven peak it reached during the Great Depression.[1]

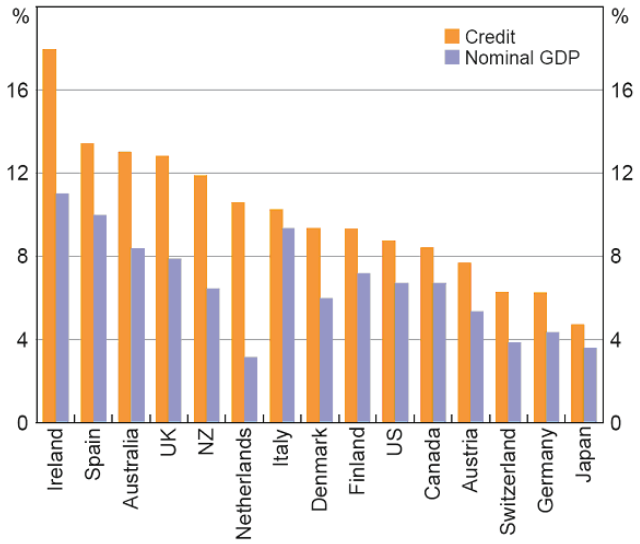
Figure 1: Australian Private Debt to GDP Ratio and Inflation Rate, 1880-2009



1 The pre-1953 debt to GDP data presented in this article is derived from Reserve Bank of Australia (1999) and Battellino (2007); the post-1953 data comes from the RBA Statistical Bulletin Table D02 (*http://www.rba.gov.au/)*. Pre-1950 data on the Consumer Price Index comes from Vamplew (1987).

Had central banks around the world not intervened in 1987, it is quite possible that we would have had a mild depression back then—a depression because de-leveraging would have depressed economic activity, and a mild one because inflation would have helped reduce the debt burden. Instead, the rescues encouraged financial institutions across the globe to move from one debt-financed bubble to another, with the consequence that for most of the OECD, private debt has risen substantially faster than GDP for the past 3 decades, as shown in Figure 2 below.

Figure 2: Debt and GDP Growth in the OECD Countries - Average Annual Percentage Change, 1997-2007

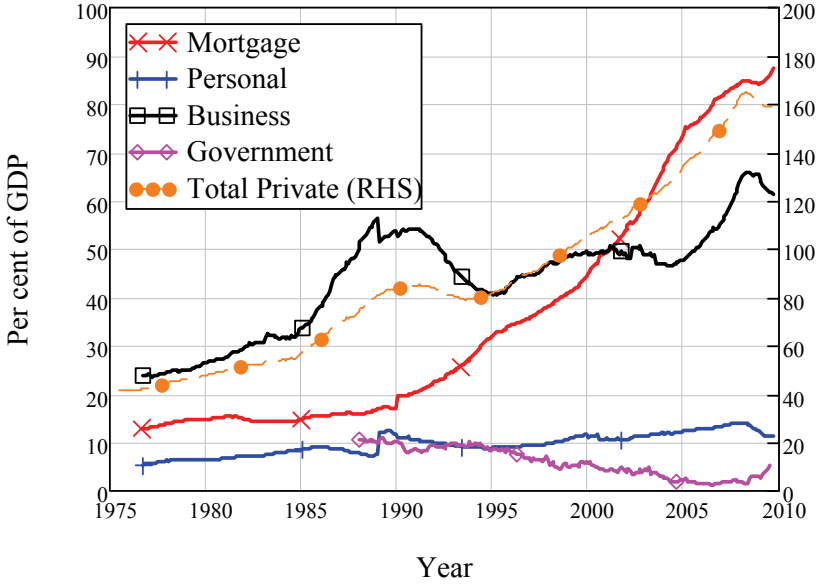


Sources: ABS, Thomson Financial and World Bank; compiled by Battellino (2007).

Note: Data are from June 1984 for New Zealand, and to December 2006 for Ireland.

Australia's overall debt to GDP ratio fell slightly during the recession of the 1990s—from 85 to 79 per cent—as deleveraging by businesses more than offset the increase in mortgage debt from the comparatively low base of 20 per cent of GDP. This deleveraging of business investment is shown in Figure 3. But as Australia's housing bubble went into overdrive, the mortgage to GDP ratio increased fourfold and the aggregate debt ratio reached 165 per cent of GDP—100 per cent above the level at the end of 1929, and two-thirds higher than the previous record level set in 1892 during the 1890s depression. The unwinding of this huge debt burden, coupled with an inflation rate that is now falling towards zero, will cause a deleveraging-led economic downturn that could rival the Great Depression in severity.

Figure 3: Australian Debt to GDP Ratios, by Sector, 1975-2009



Leverage and Economic Activity

One of the many false assumptions that blinded neoclassical economists to the approaching crisis was the proposition that money has no long-lasting impact on the real economy. In fact, we live in a fundamentally monetary credit-based economy, and in such an economy, aggregate demand is the sum of income *plus the change in debt*.

When the debt to GDP ratio is small, so too is the contribution that an increase in debt can make to demand, and changes in debt are relatively unimportant. But as debt grows relative to GDP, then even a small change in debt can constitute a major proportion of aggregate demand.

Figure 4, showing the private debt contribution to demand and unemployment, illustrates the rising role of debt in driving demand by showing the correlation between the debt-financed fraction of demand and the rate of unemployment.[2]

As the private debt to GDP ratio rose from under 50 per cent of GDP back in 1970s to three times that today, the share of aggregate demand that came from an increase in debt rose from as little as 4 per cent in 1972 to as much as 19 per cent in 2007-8.

In the 1950s and 1960s, debt's contribution to demand had little impact upon changes in unemployment but, from 1975 on, this contribution explained most of the movement in unemployment: when debt-financed spending went up, unemployment went down.[3] The economy had become debt-dependent, and the numerous rescues of the financial system by central banks simply extended this period of debt-dependence for another two decades.

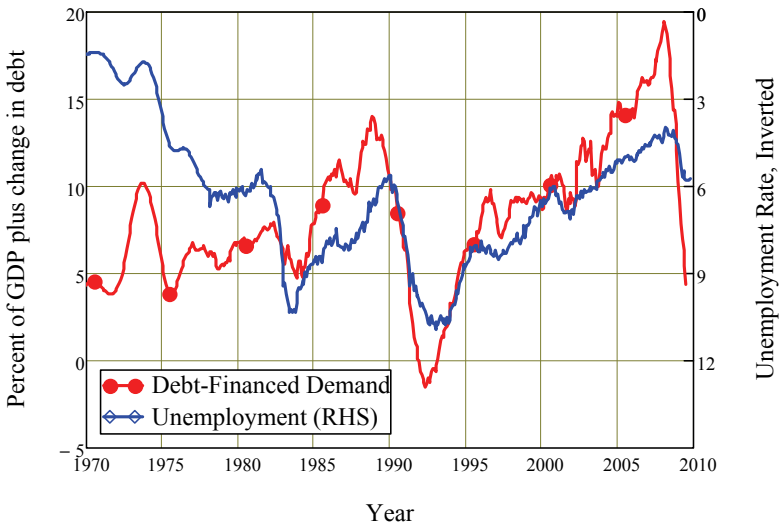
This fundamentally monetary contribution to demand was completely ignored by conventional neoclassical economists, yet it was primarily responsible for the illusory prosperity of the last fifteen years.

---

2 The debt-financed fraction of demand may be defined as the change in debt, divided by the sum of GDP plus the change in debt.

3 The correlation coefficient between the two series since 1990 is -0.94.

Figure 4: Private Debt Contribution to Demand and Unemployment in Australia, 1970-2009



Unfortunately, leverage is a factor that cuts both ways: while a debt-financed speculative bubble drives up demand, deleveraging after the bubble has burst subtracts from it. Deleveraging by the private sector – producing a reduction of the debt to GDP ratio – will soon reduce aggregate demand as it did during the 1990s recession, and drive unemployment up as a result. Given the scale of debt today, at 100 per cent above that of 1929, it could take much more than a decade of deleveraging to reduce debt to levels at which its contribution to economic activity is minor.

That period will be one in which aggregate demand is substantially below GDP, since debt will be reduced by households and businesses spending less than they earn. Growth in GDP will therefore fall below the level needed to sustain the level of employment, adding to the depressing effect of deleveraging.

Can Economic Policy Resolve the Crisis?

Having helped caused this problem by ignoring—and in the US's case, effectively encouraging—the growth of debt-financed asset bubbles, central banks around the world are now trying to ward off their deleterious effects. All manner of non-conventional policies are being tried—including notably Bernanke's policy of 'quantitative easing' by the Federal Reserve in the USA, which doubled the monetary base in four months during 2008.[4]

While the Australian central bank has not yet gone this far, the stimuli imparted by the RBA's 4.25% cut in interest rates in 2008-9 and the Rudd Government's deficit spending has been enormous. As Rudd's renowned essay in *The Sydney Morning Herald* and other Fairfax papers emphasized, the scale of the global monetary and fiscal effort to counter the financial crisis is unprecedented:

> On the fiscal front, governments from the world's largest 20 economies are expected to collectively pump about $US5 trillion into their economies by the end of next year (or nearly 8 per cent of global GDP since the crisis began). Altogether, the measures are the equivalent of an extraordinary and unprecedented 18 per cent of global GDP (Rudd 2009).

In Australia, this effort has to date been successful in attenuating the impact of the Global Financial Crisis—though other factors, including Australia's peculiar position as a developed economy commodity exporter, have also delayed the Antipodean impact of the crisis.

The question remains whether these monetary and fiscal rescues will be sufficient to restore the Australian (and global) economies to their previously customary rates of growth. That is certainly the expectation of neoclassical economists, who are as united in their expectation that the worst is now over as they were previously in their belief that there would be no crisis at all. From my Minskian point of view, their confidence could be well founded under only two conditions, whereby:

---

4 See *http://research.stlouisfed.org/fred2/series/BOGAMBSL?cid=124*.

- the crisis was solely the result of a 'credit crunch' caused mainly by the collapse of subprime lending in the USA; or
- as in all other post-1970 recessions, the debt to GDP ratio could increase after the crisis.

A 'credit crunch' can be seen as an interruption to the standard flows of finance when lenders and borrowers suddenly become risk averse. I have developed a dynamic model of a pure credit economy that simulates a credit crunch via a drop in the rate of creation of new credit money, an increase in the rate of repayment of outstanding debts, and a reduction in the turnover rate of bank reserves (see Keen 2009: 13-22 for the technical details). A simple extension of this model allows the simulation of a one-off injection of 'fiat' money into this pure credit system.

Figures 5 and 6 (on the following page) show some simulated projections. An injection of an amount equivalent to 3.5% of the aggregate money supply does indeed reduce the severity of the downturn—though the effect is much greater if the money is deposited in debtors' bank accounts rather than deposited in bank reserves.[5]

5 A 'pulse' is added externally to the money supply, either via an injection to bank reserves or as a deposit into bank accounts. The former simulates Bernanke's quantitative easing in the USA; the latter simulates a fiscal stimulus similar to Rudd's cash handouts to households.

Figure 5: Simulated Money Supply Dynamics in a Credit Crunch with a Government Rescue

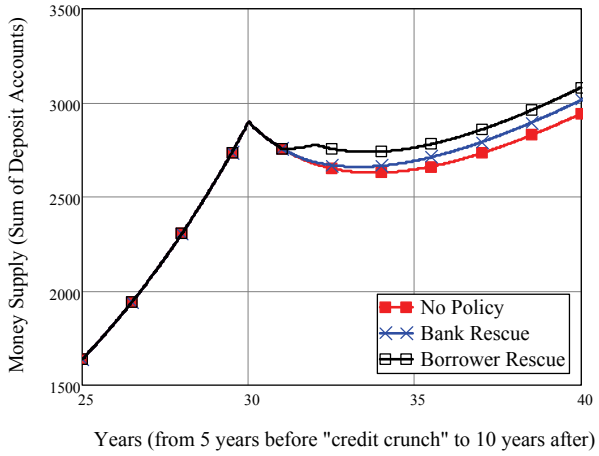
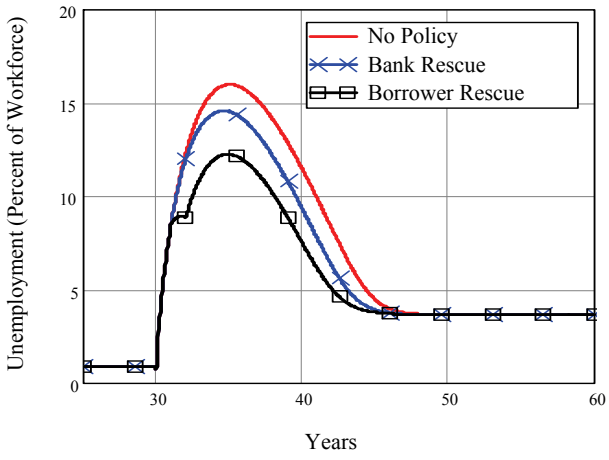


Figure 6: Simulated Unemployment Dynamics in a Credit Crunch with a Government Rescue



Thus if the crisis were solely due to an increase in risk aversion, then a government rescue could reduce the severity of the crisis, and a resumption of pre-crisis levels of lending would restore economic activity to its previous level.

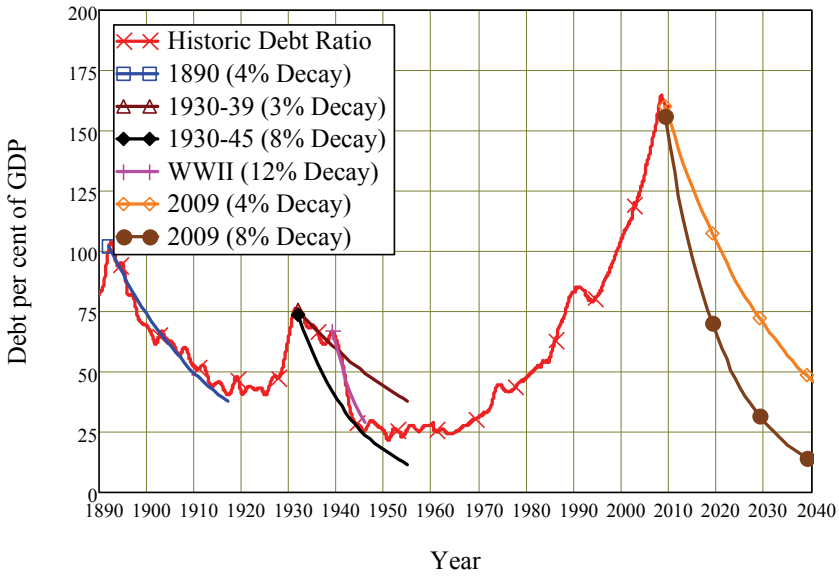
However, the current economic crisis is not of this character. With all sectors of the Australian and global economies (except in general governments themselves) carrying unprecedented levels of debt, this crisis was caused not merely by a credit crunch, but also by the unsustainability of economic development that relied upon ever-increasing debt to income ratios. A leverage-led recovery is extremely unlikely—and would only delay the day of reckoning in any case.

The far more likely prognosis, as Prime Minister Rudd acknowledged in his essay, is for a 'slow and difficult recovery, dominated by de-leveraging and deflationary risks' (Rudd 2009, citing Martin Wolf). Any recovery, therefore, will be in the context of falling debt levels, which in turn implies that aggregate demand will be less than GDP for some substantial time.

This is something that the post-WWII world economies—and current economists—have never experienced. The only precedents are from the deleveraging episodes after of the 1890s and 1930s depressions. The impact that deleveraging might have today can be estimated from the rate at which deleveraging occurred back then, and the levels to which it fell before stabilizing.

Figure 7 (on the following page) presents relevant data for the earlier historical periods, compared with alternative current scenarios, showing debt as a percentage of GDP.

Figure 7: Deleveraging Then and (Hypothetically) Now



In the 1890s, Australia's private debt to GDP ratio peaked at 102%, and then fell at roughly 4% p.a. for 15 years before stabilizing at 40% of GDP. In the 1930s, the ratio peaked at 77% before falling at 3% p.a. until 1939, and then at 12% p.a. during WWII; so that over the entire period from 1930 till 1945 the rate of deleveraging was 8% before debt stabilized at 25% of GDP.

Recovery from the 1890s depression was effectively undertaken in a 'policy-free' zone, while the 1930s included everything from active policies (Roosevelt's 'New Deal'), through potentially misguided economic ones (Australia's 'Premier's Plan') and the impact of World War II. We might therefore regard a 4% deleveraging rate as the limit to endogenous debt reduction, and 8% as the policy maximum (this time hopefully avoiding a World War).

Given those parameters, a 4% rate of deleveraging would take until 2028 to reduce the debt ratio to 75% of GDP, while an 8% rate would take until 2018.[6] With aggregate demand as the sum of GDP plus the change in debt, a 4% rate of deleveraging would initially subtract 6% from Australia's aggregate demand (since private debt is 1.6 times higher than GDP), while an 8% rate of deleveraging would initially subtract 12%. If deleveraging ceased and debt stabilized at the 75% level, then in its last year deleveraging would deduct 3% from aggregate demand at the 4% rate, and 6% at the 8% rate.

This is a drag on economic performance that has not troubled us in past recoveries, when as Figure 1 shows, debt levels rose relative to GDP after each crisis. Since neoclassical economists do not consider the dynamics (or even statics!) of credit, they are ignoring this brake on our future economic performance as they predict a return to stable growth.

Conclusion

Marx once famously noted that 'Men make their own history … not … as they please…, but under circumstances … transmitted from the past.' He continued that 'The tradition of all dead generations weighs like a nightmare on the brains of the living' (Marx 1852: 1). No nightmare weighs more heavily on the economy than debt accumulated in unproductive speculation. Until that burden is addressed any recovery from the global financial crisis is likely to be short-lived and anaemic.

Steve Keen is Associate Professor in the Department of Economics and Finance at the University of Western Sydney.

Email: s.keen@uws.edu.au

---

6 I use 75% of GDP as a reference level because that was the level in 1987 when the stock market crash occurred, and this was almost equivalent to 'peak debt' during the Great Depression. Even those who greet unprecedented debt to GDP ratios with the 'this time is different' argument should concede that this ratio, which is three times the level that applied in 1945-65, should be at the upper end of the debt levels that the Australian economy can sustain.

Appendix: The Credit Crunch Model

Full details of the model are given in Keen (2009); this Appendix describes the design of its financial component.

The model considers a pure credit economy with three classes – capitalists, workers and bankers – where all transactions occur via bank accounts maintained by the banking sector. The government rescue is then shown as a *deus ex machina* injection of fiat money that can be made into either the banking sectors reserve or to the firm sector's deposit accounts.

Though the model is a superficially foreboding set of differential equations, its financial essence is rather easily understood when the financial flows are laid out in a 'double-entry book-keeping format' as shown in the first table below. Each row in the table is a specific financial transaction--accrual of interest, payment of wages, etc.

Bank Accounts		**Assets (Reserves & Loans)**		**Liabilities (Deposits)**		
Actions		Reserves (B_R)	Loans (F_L)	Firms (F_D)	Workers ($_{WD}$)	Banks (B_I)
1	Compound Interest		***A***			
2	Pay Interest		***-B***	***-B***		***+B***
3	Deposit Interest			***+C***		***-C***
4	Wages			***-D***	***+D***	
5	Worker Interest				***+E***	***-E***
6	Consumption			***+F+G***	***-F***	***-G***
7	Loan Repayment	***+H***	***-H***	***-H***		
8	Money relending	***-I***	***+I***	***+I***		
9	Money creation		***+J***	***+J***		
10	Rescue Banks	***+K***				
	Rescue Firms			***+K***		

The actions shown in each row are detailed in the following table:

	Action	Description	Terms
1	Compound Interest	Outstanding debt F_L is increased at the rate of interest on loans r_L.	$r_L.F_L$
2	Pay Interest	Accrued interest on outstanding debt is paid. This involves a transfer from the firm sector's deposits F_D to the bank sector's income account B_I, and the recording of this transfer on the debt ledger F_L.	$r_D.F_L$
3	Deposit Interest	Interest is paid (at the lower rate r_D) on the balance in the firm sector's deposit account	$r_D.F_D$
4	Wages	This is a transfer from the firm sector's deposit accounts to workers' deposit accounts W_D, using two insights from Marx: firstly that the surplus in production is distributed between workers and capitalists (in shares that sum to 1 in this model--so workers get *1-s* and capitalists get *s*); secondly that there is a turnover period (τ_S as a fraction of a year) between M and M+ (see Capital II Chapter 12).	$(1-s).F_D/\tau_S$
5	Worker Interest	The deposit interest rate times the balance in workers' accounts.	$r_D.W_D$
6	Consumption	This employs the concept of a time lag--the length of time it takes workers to spend their wages is 2 weeks (say) or 1/26th of a year so that τ_W equals 1/26. Wealthier bankers spend their account balances much more slowly.	$W_D/\tau_W+B_I/\tau_B$
7	Loan Repayment	The rate of loan repayment is proportional to the outstanding level of loans divided by the time lag τ_L in loan repayment (for a standard housing loan this would be shown as τ_L =25)	F_L/τ_L
8	Money relending	The rate of new money creation is the balance in the banking sector's unlent reserves, divided by a turnover lag representing how rapidly existing money is recycled.	B_R/τ_R
9	Money creation	The rate of new money creation is the balance in the firm sector's deposit account, divided by a time lag that represents the length of time it takes for the money supply to double.	F_D/τ_M
10	Rescue Banks	This is a '*Deus Ex Machina*' injection of 100 currency units one year after the crisis begins, for a period of one year, into *either* the banking sectors reserves B_R *or* the firm sector's deposit accounts F_D.	100
	Rescue Firms		

A model of financial flows is then generated simply by adding up the entries in the columns above, as shown in the table below This is then attached to a simple model of production in which the rate of change money wages (W) depend on the rate of employment (L/N) via a

'Phillips Curve', output (Q) is labour (L) times labour productivity (a), and both population (N) and labour productivity grow at constant rates.

Rate of change of...	Equals...
Bank Reserves B_R	$H-I+K$
Firm Loans F_L	$-H+I+J$
Firm Deposits F_D	$-B+C-D+F+G-H+I+J+K$
Worker Deposits W_D	$D+E+F$
Bank Income B_I	$+B-C-E-G$

The model is easily simulated in any modern mathematics program (like Mathcad or Matlab) but this kind of work is beyond the capabilities of spreadsheets like Excel.

References

Battellino, R. (2007), Some Observations on Financial Trends, *Reserve Bank of Australia Bulletin*, October 2007, pp 7-14.

Bezemer, D. J. (2009), *'No One Saw This Coming': Understanding Financial Crisis Through Accounting Models*, Faculty of Economics University of Groningen, Groningen, The Netherlands.

Graziani, A. 2003, *The monetary theory of production*, Cambridge University Press, Cambridge, UK and New York .

Keen, S. (1995), Finance and Economic Breakdown: Modeling Minsky's 'Financial Instability Hypothesis',, *Journal of Post Keynesian Economics*, vol. 17, no. 4, pp 607-635.

Keen, S. (2009), Bailing out the Titanic with a Thimble, *Economic Analysis & Policy*, vol. 39, no. 1, pp 3-24.

Marx, K. (1852), *The Eighteenth Brumaire of Louis Bonaparte*, Progress Publishers, Moscow.

Minsky, H. P. (1977), The Financial Instability Hypothesis: An Interpretation of Keynes and an Alternative to 'Standard' Theory, *Nebraska Journal of Economics and Business*, vol. 16, no. 1, pp 5-16.

Reserve Bank of Australia (1999), *Two Depressions, One Banking Collapse*, Sydney.

Rudd, K. (2009), Pain on the road to recovery, *Sydney Morning Herald*. *http://www.smh.com.au/national/pain-on-the-road-to-recovery-20090724-dw6q.html?page=-1*.

Stevens, G. (2008), Interesting Times, *Reserve Bank of Australia Bulletin*, December, pp 7-12.

Vamplew, W. (1987), *Australian Historical Statistics*, Fairfax, Syme & Weldon Associates.