

# Household Debt—the final stage in an artificially extended Ponzi Bubble

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## 1. The Macroeconomics of Private Debt

Private debt is largely ignored by conventional macroeconomics. It is a key issue in the non-orthodox ‘Minskian’ approach to economics, which rejects the standard ‘veil over barter’ attitude towards money (Minsky (1982a)). Ironically, though Friedman championed ‘money neutrality’, unintended support for Minsky’s ‘money matters’ position can be found in Friedman. His well-known assertion that the nominal quantity of money was irrelevant contained an important but neglected proviso, highlighted below:

IT IS A COMMONPLACE of monetary theory that nothing is so unimportant as the quantity of money expressed in terms of the nominal monetary unit... let the number of dollars in existence be multiplied by 100; that, too, will have no other essential effect, *provided that all other nominal magnitudes (prices of goods and services, and quantities of other assets and liabilities that are expressed in nominal terms) are also multiplied by 100*. Friedman (1969 , p. 1; Emphasis added)

In the real world in which we live, assets and liabilities are *not* indexed to the rate of inflation.<sup>1</sup> Nominal magnitudes therefore *do* matter in macroeconomics, because they determine our capability to service past financial commitments out of current cash flows. My Minskian focus upon debt is the reason I was able to anticipate a serious financial crisis (Keen (1995), (1996),<sup>2</sup> (2000), (2007)) while leading neoclassical macroeconomists were busy debating the causes of the now defunct ‘Great Moderation’ (Bernanke (2004)).

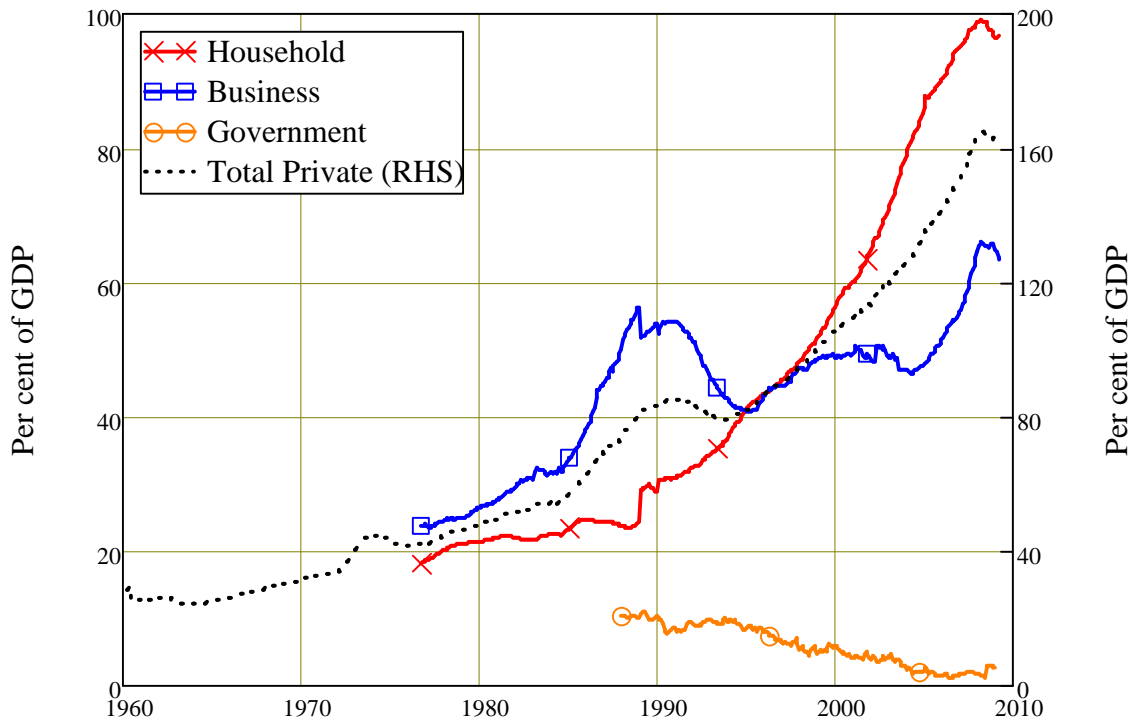
The impact that private debt has on the economy is affected by its scale relative to GDP, its composition, purpose, and rate of change. On all four fronts, our current debt crisis is more severe than that which caused the Great Depression (Fisher (1933)).

## 2. Magnitude, Composition and Purpose

In late 1990, Australia’s private debt to GDP ratio peaked at 85 per cent. It then fell to 79 per cent in mid-1993, only to more than double to a peak of 165 per cent in March 2008.

This literally exponential rise in the debt ratio masked an important change in its composition. The business ratio fell sharply between late 1990 and 1995, and only returned to 1990 levels in 2006. The household ratio, on the other hand, rose at 6.6 per cent per annum between 1990 and March 2008, while the mortgage ratio rose at 8.5 per cent per annum.<sup>3</sup> This took household debt from 30 to 99 per cent of GDP—and mortgage debt from 20 per cent to 85 per cent—in just over 18 years.

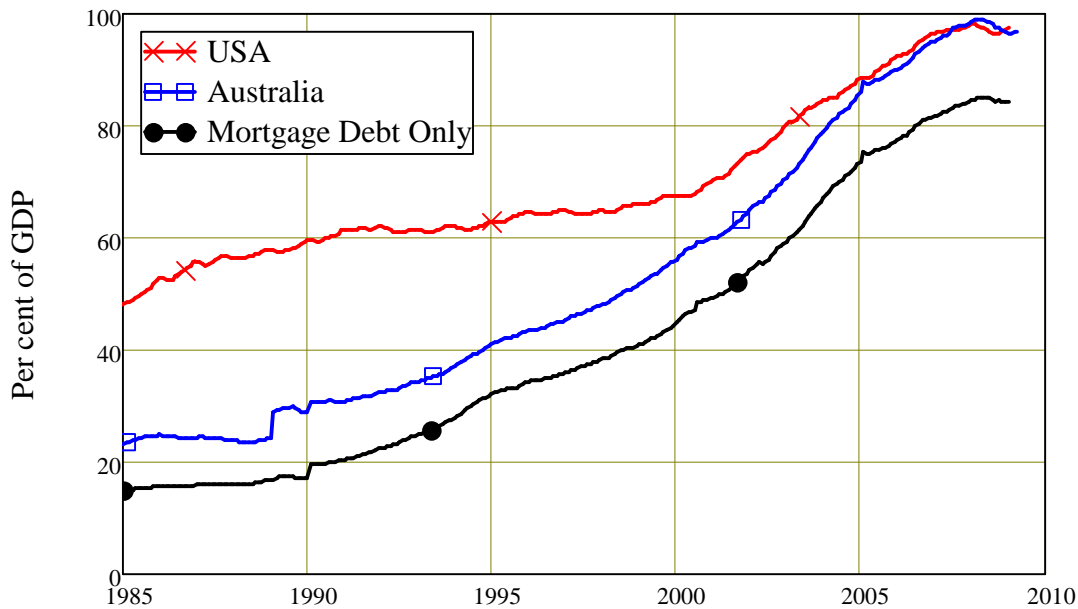
FIGURE 1 ABOUT HERE: *Australian Debt to GDP Ratios*



RBA Bulletin Tables D02 & G12

Though the US household debt binge has grabbed the headlines, ours was actually more dramatic. America's ratio was twice Australia's in 1990, but grew much more slowly—a mere 2.3 per cent per annum from 1990 till its peak of 98 per cent in 2008. Though lending here may not have been as irresponsible at the individual level as in America, the aggregate effect has been the same: Australian households, like their American counterparts, have a higher ratio of debt to income than ever before.

FIGURE 2 ABOUT HERE: *Australian vs US Household Debt to GDP Ratios*



RBA Bulletin; FRB Flow of Funds ltab1d, atab6d

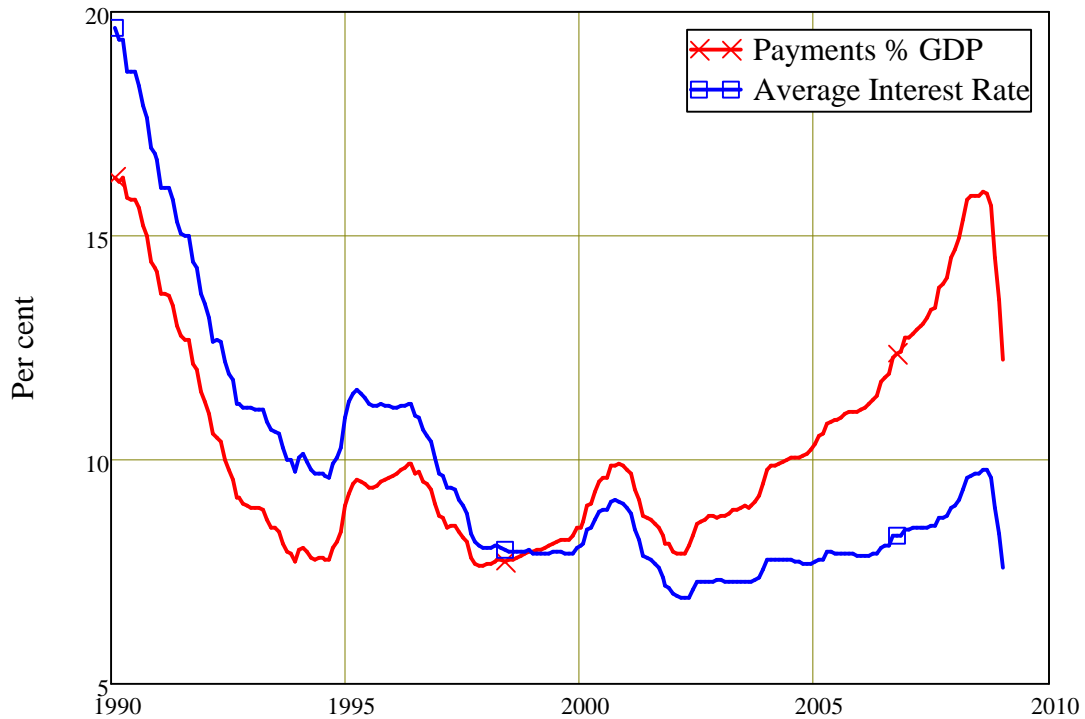
Attempts to explain increasing debt as merely an equilibrium response to falling interest rates do not withstand scrutiny. RBA Governor Stevens put this proposition to the Parliamentary Standing Committee on Economics and Finance in 2007, in answering whether ‘cheaply available credit’ had influenced asset prices:

The rough statistic that I have quoted many times was that the average rate of interest was about half; that meant you could service twice as big a debt. Guess what? That is exactly what occurred, and that had a very profound effect on asset values. Standing Committee On Economics (2007, p. 26)

If this were true, then interest payments to GDP would have remained roughly constant as interest rates fell, rose and fell again over 1990-2008. At the aggregate level and at the two extremes—1990, when the average interest rate was almost 20 per cent, and 2008, when ‘Peak Debt’ occurred—this statement appears approximately correct. However over time the debt service ratio was *not* constant, but fell substantially as interest rates also fell, only to rise back to 1990 levels by 2008.

The aggregate data also masked the substantial changes in the composition of debt over time: though the aggregate ratio did roughly double, business debt increased a mere 22 per cent (after having fallen as much as 25 per cent) while household debt more than tripled.

FIGURE 3 ABOUT HERE: *Private Debt Service Ratio and Interest Rates*

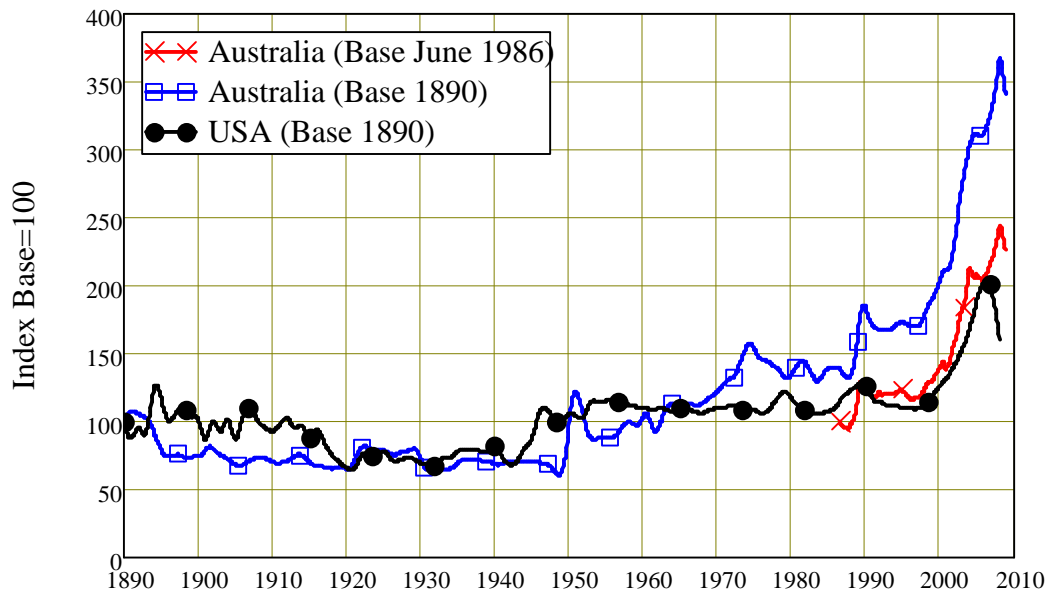


Source: RBA Bulletin

As in 1990, the 2008 debt service level was not an equilibrium, but rather a maximum at which debt service costs caused a sudden swing from prosperity to a severe economic downturn.

Though the argument that the rise in debt was an equilibrium response to falling interest rates is false, the proposition that it drove asset prices is defensible. Again, though the US house price bubble has grabbed the headlines, on any measure the Australian bubble has been bigger. Without adjusting for differences in base years, the peak in the Australian real house price index was 20 per cent higher than the peak in the American index. When adjusted to the same base year using data from Stapledon (2007, Table 2.5, pp. 64-65), the Australian index was a mere 8 per cent higher than the American in 1987, but rose to be 81 per cent higher than the American peak.

FIGURE 4 ABOUT HERE: *Real House Price Indices*



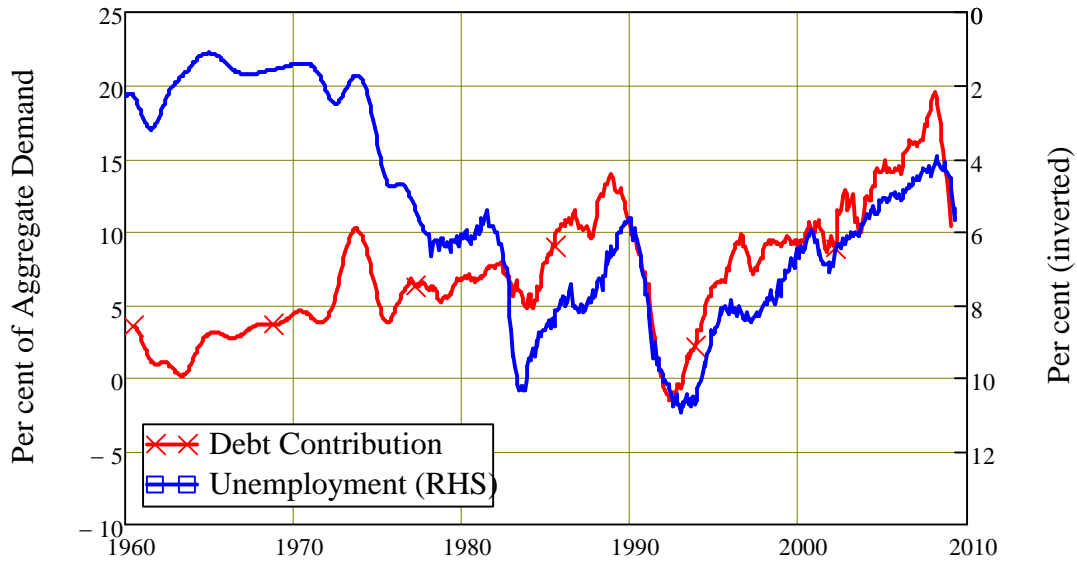
Stapledon, ABS 6416, Case-Shiller

Speculation, rather than investment, was overwhelming the focus of post-1990 lending. The primary role of mortgage debt was to purchase existing dwellings rather than to finance the construction of new ones: in 1985, less than 25 per cent of new mortgage finance was for new dwellings; by 2000 this had fallen below 10 per cent. 85 per cent of the additional A\$985 billion of mortgage debt accumulated since 1986 has therefore predominantly inflated house prices, rather than built new homes. Margin lending—which rose from \$4.7 billion to \$37.75 billion between late 1999 and 2008—was clearly for speculative purposes only. Since a substantial proportion of recent business debt also financed speculative activity—leveraged buyouts, mergers and acquisitions and the like—over half of Australia’s \$1.9 trillion private debt financed speculation rather than investment.

### 3. Rate of Change

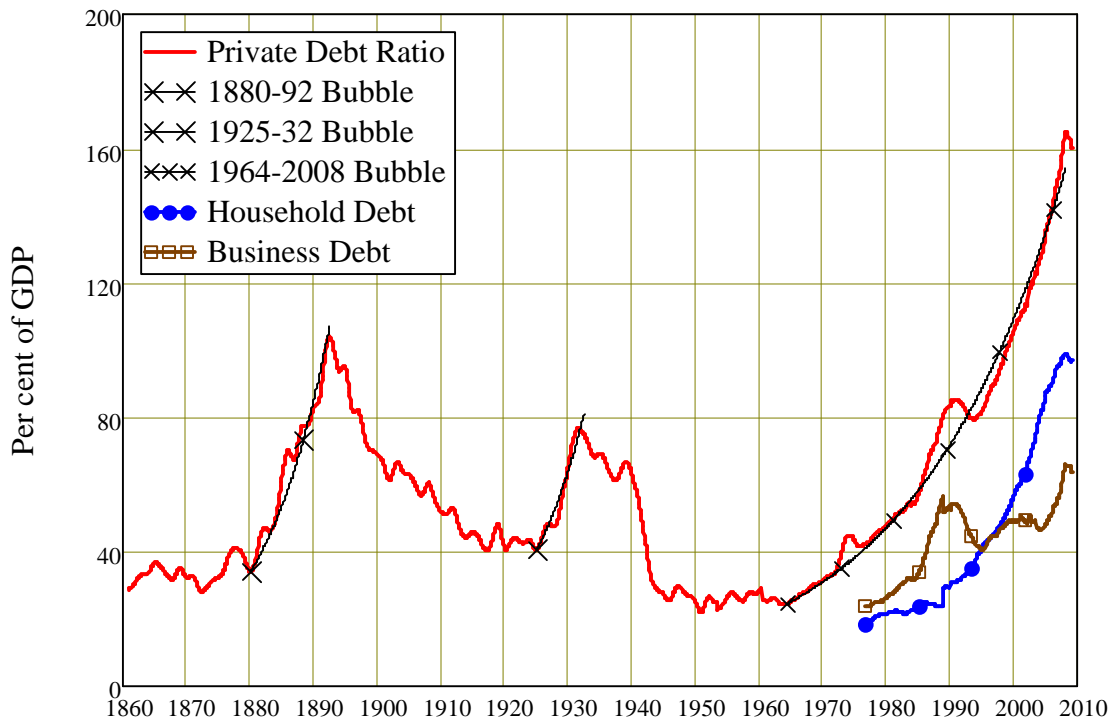
The rate of change of debt and its magnitude relative to GDP determine the contribution that changes in debt make to aggregate demand, which in our credit-driven world is the sum of GDP *plus the change in debt*. This demand is clearly spread across all markets, commodity and assets alike, so that where a change in debt-financed demand will fall cannot be determined a priori—but that impact is now substantial. Before 1970, the change in private debt was responsible for less than 5 per cent of aggregate demand. Since 1980, it has been responsible for up to 20 per cent of demand, and it has become the dominant factor in determining the level of unemployment. In our debt-dependent economy, rising debt reduces unemployment, while falling debt increases it.

FIGURE 5 ABOUT HERE: *Debt Contribution to Demand and Unemployment*



This is the third and by far the largest debt bubble in Australia's economic history. Just as the bursting of the two earlier debt bubbles ushered in Depressions, I expect the same will result from the bursting of this bubble, and for the same reason. De-leveraging by the private sector will significantly reduce aggregate demand, and cause a consequent severe reduction in economic activity and employment.

FIGURE 6 ABOUT HERE: *Australian Long Term Debt to GDP Ratios*



Battellino 2007; Fisher & Kent 1999; RBA Bulletin

## 4. Drivers of the bubble—lenders or borrowers?

Though focusing on aggregate debt alone from 1993 till now obscures the important recent role of rising household debt, over the much longer term the aggregate ratio illustrates that the ultimate responsibility for debt bubbles lies not with the irrational exuberance of borrowers, but the credit-creation practices of lenders (Battellino (2007, Graph 3, p. 15); Fisher and Kent (1999, Figure 4, p. 7 & Figure 5, p. 9)).

At the aggregate level, the debt bubble can be dated back till mid-1964, when a 20-year period of a stable debt ratio gave way to 44 years in which private debt grew 4.2 per cent faster than nominal GDP. The correlation of the private debt ratio with a simple exponential function is both extraordinarily high, and *higher* over the period 1964-2008 than the correlation of either disaggregated series over the shorter time period for which data is available (see Table 1 and Keen (2009)).

**Table 1: Growth Rates of Private Debt to GDP Ratios**

<i>Ratio to GDP</i>	<i>Time Period</i>	<i>Growth Rate</i>	<i>Exponential Correlation</i>
Aggregate	June 1964-March 2008	4.2%	0.991
Business	September 1976-March 2008	3.09%	0.769
Household	September 1976-March 2008	5.16%	0.985

## 5. Modelling the Dynamics of Speculative Finance

In Keen (2009) I constructed a model of endogenous money creation that is consistent with the empirical data on money dynamics—which contradicts the standard ‘money multiplier’ model of credit money creation (see Kydland and Prescott (1990), Moore (1979) and (1983)). The model explained both the tendency of financial system to provide as much credit as businesses and households are willing to accept, and simulated the impact of a credit crunch on economic activity.

Here I extend my model of Minsky’s ‘Financial Instability Hypothesis’ (*FIH*; Keen (1995)) to include one aspect of Minsky’s hypothesis that I did not originally incorporate, but which is clearly of vital importance in the actual dynamics of debt: borrowing to finance not productive investment, but ‘Ponzi’ speculation on asset prices. As outlined above, this was the overwhelming purpose of the growth in household debt since 1990.

Minsky's hypothesis considers an economy in historical time, starting at a time where the economy is growing relatively stably, but firms and banks are conservative about debt levels after a recent economic crisis. However, the combination of a relatively tranquil economy and conservative investment behaviour means that most projects succeed.

Two things gradually become evident: ‘Existing debts are easily validated and units that were heavily in debt prospered: it paid to lever’ (Minsky (1982a, p. 66)). As a result, both

firms and banks come to regard the previously accepted risk premium as excessive. Investment projects are evaluated using less conservative estimates of prospective cash flows, so that with these rising expectations go rising investment and asset prices. The general decline in risk aversion thus sets off the growth in debt-financed investment, which is the foundation both of the boom and its eventual collapse. In Minsky's classic phrase, 'Stability—or tranquility—in a world with a cyclical past and capitalist financial institutions is destabilizing' (Minsky (1977, p. 66)).

The economy enters a phase which Minsky characterised as 'the euphoric economy', where both lenders and borrowers believe that the future is assured, and therefore that most investments will succeed. Asset prices are revalued upward as previous valuations are perceived to be based on mistakenly conservative grounds. Financial institutions now accept liability structures both for themselves and their customers 'that, in a more sober expectational climate, they would have rejected' (Minsky (1982b, p. 55)).

Asset price inflation in the euphoric economy phase makes it possible to profit by trading assets on a rising market, giving rise to a class of speculators Minsky calls 'Ponzi financiers', after the once again well-known American swindler (Minsky (1982a, p. 101)). These speculators are willing to incur debts whose servicing costs exceed the cash flows of the assets they buy, because they expect to be able to on-sell these assets at a profit. However the rising interest servicing costs incurred in this period eventually force speculative and non-speculative investors alike to sell capital assets to meet their debt commitments, and the entry of additional sellers into the asset market pricks the exponential rise in prices on which Ponzi financiers depend. The leading Ponzis go bankrupt, bringing the euphoric economy to an abrupt end and ushering in another debt-induced systemic crisis.

A comprehensive model of this process would include asset price dynamics as well as debt.<sup>4</sup> However the essence of Ponzi speculation is that debt is taken on that does not add to the economy's productive capacity. This can easily be introduced into my Minsky model (built as an extension to Goodwin's growth cycle model Goodwin (1967)) via a nonlinear Ponzi investment function that depends on the rate of economic growth, and which is financed entirely by debt. The model structure is outlined in Table 2:

**Table 2: Causal Links in Model**

<i>Element</i>	<i>Equation</i>	<i>Comments, Parameter and Initial Values</i>
Output	$Y = K/v$	Capital stock and the accelerator determines output. $Y(0)=300$ , $v=3$
Capital Stock	$\frac{d}{dt}K = I(\pi_r) \cdot Y - \gamma \cdot K$	The rate of change of capital stock is investment minus depreciation. $\gamma=1\%$
Profit	$\Pi = Y - W - r \cdot D$	Profit is output minus wages and interest payments. $r=3\%$
Profit Rate	$\pi_r = \Pi/K = \Pi/(v \cdot Y)$	
Wage Bill	$W = w \cdot L$	Wage bill is wages times labour



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		employed.
Wages	$\frac{1}{w} \cdot \frac{d}{dt} w = P_C(\lambda)$	A Phillips curve relation for wage determination. $w(0)=1$
Employment Rate	$\lambda = L/N$	
Labour	$L = Y/a$	Output and labor productivity determines employment.
Debt	$\frac{d}{dt} D = I - \Pi + P_K$	The rate of change of debt equals investment minus profits plus speculation. $D(0)=0$
Speculation	$\frac{d}{dt} P_K = \kappa(g) \cdot Y$	The rate of change of Ponzi speculation is a nonlinear function of the rate of growth. $P_K(0)=0$
Rate of growth	$g = (I(\pi_r)/v) - \gamma$	
Investment	$I(\pi_r) = G_{Exp}(\pi_r, 3\%, 3\%, 1, 0)$	Investment is a nonlinear function of the rate of profit.
Phillips curve	$P_C(\lambda) = G_{Exp}(\lambda, 96\%, 0, 2, -4\%)$	Wage change is a nonlinear function of the rate of employment.
Ponzi behaviour	$\kappa(g) = G_{Exp}(g, 3\%, 0, 3, -25\%)$	Speculation is a nonlinear function of the rate of growth.
Generalised Exponential	$G_{Exp}(x, x_v, y_v, s, m) = (y_v - m) \cdot e^{\frac{s}{y_v - m}(x - x_v)} + m$	Generalised exponential. Arguments $(x_v, y_v)$ coordinates, slope at $(x_v, y_v)$ and minimum value $m$ .
Population	$\frac{d}{dt} N = \beta \cdot N$	$\beta=1\%$ , $N(0)=330$
Labour Productivity	$\frac{d}{dt} a = \alpha \cdot a$	$\alpha=2\%$ , $a(0)=1$

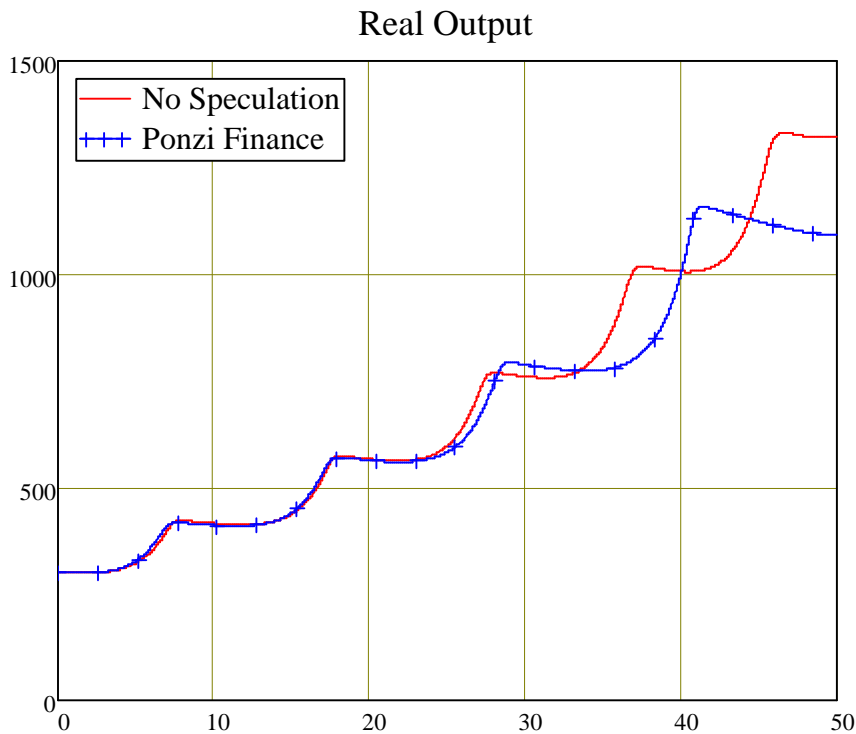
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This reduces to a model with 6 system states:

$$\begin{aligned}
\frac{d}{dt} Y &= g \cdot Y \\
\frac{d}{dt} w &= P_c(\lambda) \cdot w \\
\frac{d}{dt} D &= I(\pi_r) \cdot Y - \Pi + P_k \\
\frac{d}{dt} P_k &= \kappa(g) \cdot Y \\
\frac{d}{dt} a &= \alpha \cdot a \\
\frac{d}{dt} N &= \beta \cdot N
\end{aligned}
\tag{1.1}$$

Without Ponzi finance, the model can generate a debt crisis given extreme initial conditions, but near its equilibrium the model is stable (the equilibrium debt ratio is negative—see Keen (2000)—implying a net positive financial position for firms). With Ponzi finance however, the system undergoes a series of boom/bust cycles with debt levels ratcheting up over time, until ultimately the debt incurred in the final cycle overwhelms the economy’s debt-servicing capacity, and a Depression ensues.

FIGURE 7 ABOUT HERE: *Output*



The presence of Ponzi Finance also leads to bigger cycles in output with a longer period. Though the average rate of growth prior to the crisis is similar to that achieved without

Ponzi lending, volatility is far greater, but the rise in volatility is somewhat masked by the increase in the period between downturns.

FIGURE 8 ABOUT HERE: *Employment*

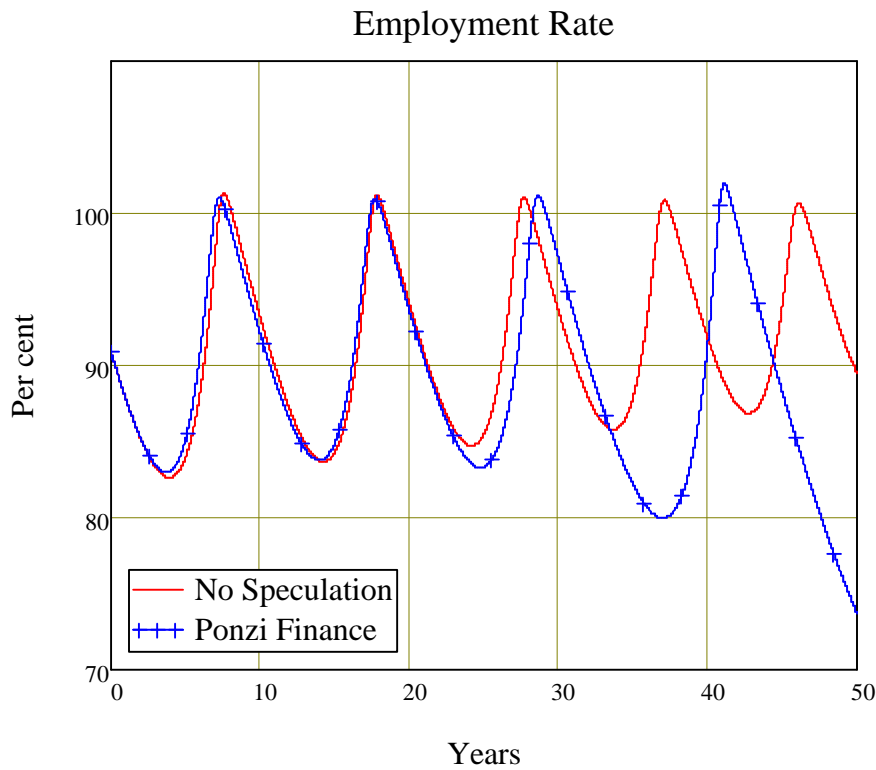


FIGURE 9 ABOUT HERE: *Employment and Income Distribution*

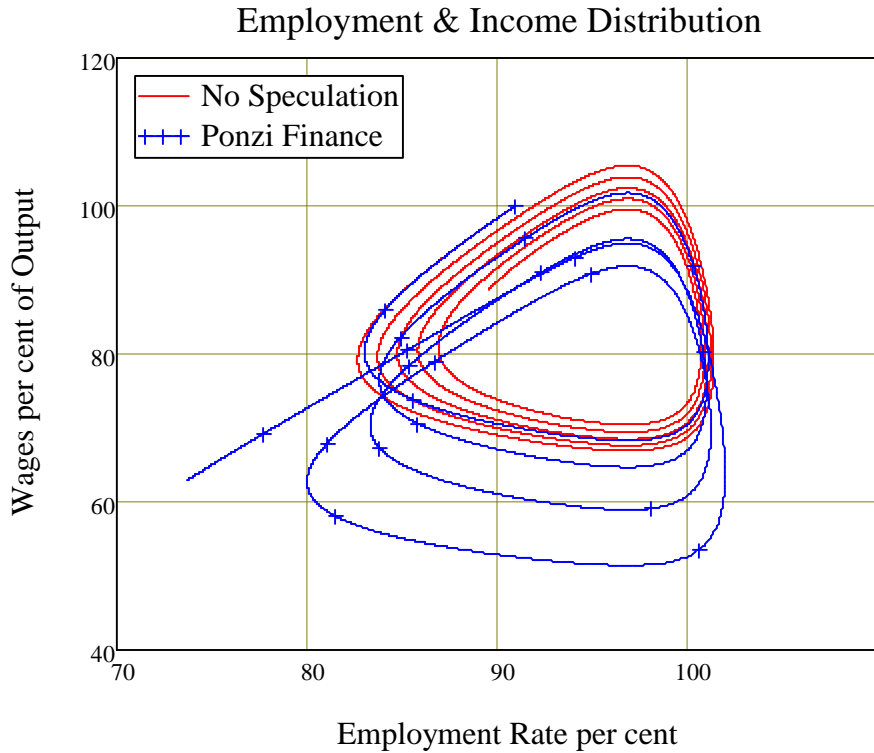
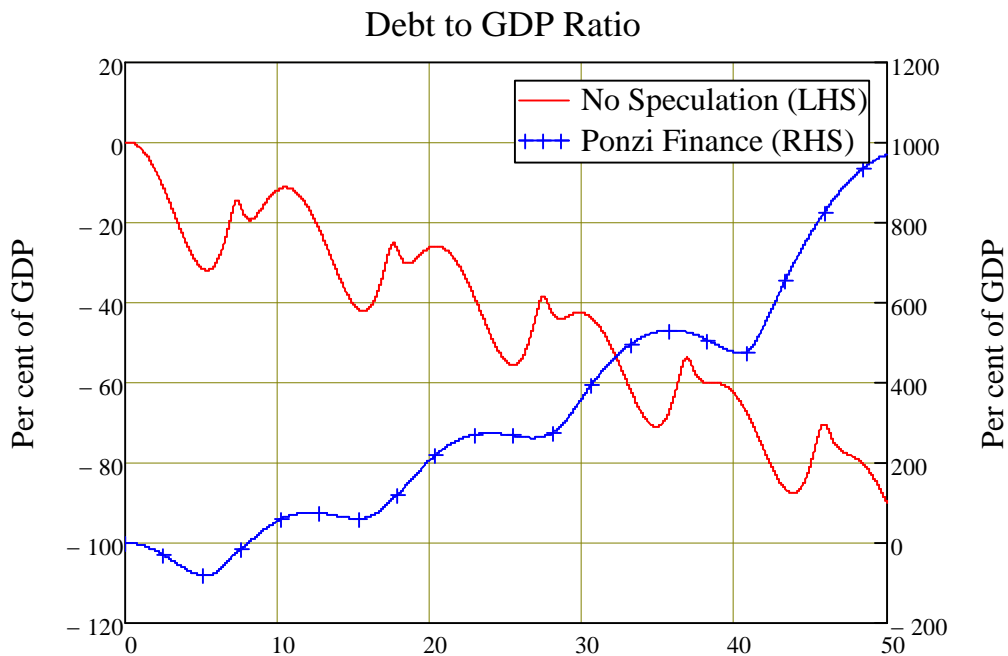


FIGURE 10 ABOUT HERE: *Debt to GDP*



A far higher level of debt is accumulated with Ponzi lending than without, and that debt level ultimately causes not merely a cyclical downturn but a complete economic collapse. Though this model has yet to be fitted to the actual data, its qualitative behaviour matches the pattern that has led to the Global Financial Crisis.

## 6. Conclusion

Had the Federal Reserve not intervened to rescue Wall Street from its excesses in 1987, there could have been a mild Depression back then. Debt levels were comparable to 1929: 159 per cent of GDP in the USA versus 173 per cent in 1929, and 73 per cent in Australia versus 64 per cent. Debt-financed demand was a much smaller fraction of aggregate demand—13 per cent in the USA, under 10 per cent in Australia—so that deleveraging would have occurred from a much lower base than today's.

Inflation was also higher—4.5 per cent in the USA versus zero in 1929, and 7.8 per cent in Australia versus 2 per cent—so that the debt burden would have been reduced by nominal factors. Finally, most of the debt was owed by businesses—who can more easily eliminate it than can households (via reducing employment, terminating investment, and bankruptcy)—and the scourges of derivatives and securitised lending had only just begun.

By forestalling a Depression then, we may have been set up for a far more serious problem now. Today, US debt is 1.7 times as high as in 1929, and deflation is already running at 0.75 per cent. Australia's debt ratio is 2.5 times what it was in 1929, and while we have not yet fallen into deflation, inflation is less than half the 1987 level. Debt-financed demand accounted for 23 per cent of aggregate demand at its peak in the USA, and 20 per cent here, so deleveraging today could swamp government attempts to reflate the economy. Households hold more debt than business, and ownership of that debt has been dispersed through society via securitised lending.

Bernanke famously apologised to Friedman on behalf of the 1929 Fed, stating that 'Regarding the Great Depression. You're right, we did it. We're very sorry. But thanks to you, we won't do it again.' (Bernanke (2002)). In fact, thanks to Friedman's flawed theory of money, the Greenspan-Bernanke Fed may one day justly stand accused of having caused a far greater crisis than that of 1929.

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<sup>1</sup> Except in Iceland, where debts (but not other nominal magnitudes such as wages) were indexed to the rate of inflation, with disastrous results.

<sup>2</sup> In my supplementary remarks to the Wallis Committee Inquiry in 1996, I anticipated that a financial crisis could result from the practice of securitised lending: "Should a substantial proportion of eligible assets (e.g., residential houses during a real estate boom like that of 87-89) be financed by securitised instruments, the inability of borrowers to pay their debts on a large scale will not, of course, directly affect liquidity in the same fashion that a failure of bank debtors does. Instead, the impact will be felt by those who purchased the securities ...Where the securities are tradeable, there would obviously be a collapse in the tradeable price, and, potentially, the bankrupting of many of the investors..."

<sup>3</sup> The correlation coefficient of the total private debt ratio between mid-1993 and March 2008 to a simple exponential function with a growth rate of 4.6% is 0.9966; the coefficient for the household debt ratio between 1990 and March 2008 with a growth rate of 6.05% was 0.9969.

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<sup>4</sup> In future research I will combine this model and that in Keen 2009 into a strictly monetary model of the *FIH*.