Heterodox economics: Ten years and growing stronger!

10th Australian Society of Heterodox Economists Conference

5-6 December, 2011
The University of New South Wales
Sydney, Australia

Conference Proceedings

- Refereed Papers -

Edited by:
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All papers in this volume were refereed by an academic panel
First published 2011
Price: $20.00
ISBN: 978-0-7334-3078-7

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Student's Refereed papers

When earthquakes are most affordable

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Abstract
This paper addresses two issues. First is the principle that a 'normal' economy does not (and should not) operate at maximum physical capacity. Second is the observation that an economy's public sector, unlike its private sector, is constrained only by physical capacity, and not by its financial capacity. Further, for the public sector, its physical capacity is inversely correlated with its financial means, meaning that construction and reconstruction programmes are most affordable precisely when governments have the least 'money'. The global economy is a closed economy that can be understood to be in a state of recession, of normality or of stress, with normality defined in such a way as to draw a clear distinction between a normal economy and a stressed economy. A stressed economy has a significantly higher labour force participation rate than does a normal economy. Governments have most money and other financial assets at their disposal in a stressed economy, and have fewest financial resources during a recession. Spare physical capacity, however, is greatest during a recession, a time in which firms and households plan to run financial surpluses. Therefore, the opportunity cost of governments purchasing goods and services following a serious natural disaster is close to zero during a recession, is affordable when an economy is in a normal state, and is very high when the economy is highly stressed. While the analysis depends on the closed nature of the global economy, this 'paradoxical' principle of public finance is also applicable to representative national economies.

1. Introduction

This year, several countries rich in real assets – New Zealand, Australia, Japan – have experienced substantial natural disasters which have placed the global private insurance industry under stress. While begging the question of whether reliance on individual insurance claims should be the principal means to manage recovery from a disaster, it has become increasingly clear that governments must act in an emergency as 'insurers of last resort'. Resources promptly mobilised by governments, and recovery goods (and services) subsequently purchased by governments, will always play an important role in disaster relief and reconstruction.

The question asked here is: "Is it more or less costly if major disasters, such as earthquakes, occur during a recession?" For our purposes, a recession is any period in which there is substantial cyclical unemployment; or – put another way – when actual gross domestic product (GDP) is significantly below ideal (normal) GDP.

In the discourse of regular politics, the affordability to a government of an earthquake relates to how much 'money' a government has. 'Money' here means, in essence, financial claims on goods and services. Constraints on governments having money are GDP itself (the tax base) and governments' willingness and capacity to incur debt. High existing levels of government debt may impose severe political constraints on governments' becoming further

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indebted.[†] In a recession, governments receive less tax revenue, and incur deficits just to meet normal expenditures on collective goods such as healthcare and education. If government revenues equate to governments' abilities to command resources, then clearly earthquakes are less affordable during recessions than at other times. But the ability of capitalist governments to acquire goods and services is not a simple function of their revenues.

2. Global Perspective

My approach here is essentially global, although I will continue to use the term GDP for global gross domestic product, in favour of the more accurate but less familiar 'gross world product'.

GDP can be imagined as an 'economic cake' that is continuously baked and consumed. Because we are used to thinking of GDP as an annual flow, we can most simply represent it as a cake-shaped aggregation of goods and services produced for sale over a year, and subject to an annual distribution. This cake represents a varying mixture, determined by shifting market forces, of consumption and investment goods.

In the model presented, there are three different types of economic agent: households, firms (together the private sector), and governments (public sector). By their nature, firms and governments are collectively debtors, while households are on average creditors. Interest flows, net, from firms and governments to households. When the world economy is in a 'normal' phase, households, firms and governments run balanced (collective) budgets. Thus, for example, the public sector globally is in debt to the private sector, but is neither adding to nor subtracting from that debt.[‡]

In this hypothesised normal phase, there is no *per capita* growth of factor inputs. World *per capita* economic growth is in the order of two percent per annum, enabled entirely by improvements in total factor productivity. In this normal state, there is no cyclical unemployment. Residual unemployment is either frictional or structural. Labour and capital are mobile. Labour force participation rates are not high, and natural resources are exploited conservatively.[§]

The normal phase is contrasted with a recession phase and a stress phase. In the *recession phase*, $Y<Yn$, where Y represents actual GDP and Yn is GDP when the economy is in its normal state. Both parts of the private sector are attempting to run surpluses; households collectively increasing their net savings, and firms collectively reducing debt. Governments, representing the public sector, offset the private sector, running collective deficits as private spending decreases. In a typical *stress phase*, $Y>Yn$, households collectively reduce their net savings (with many increasing their indebtedness), while firms take on proportionately more debt. Thus the private sector runs a collective deficit, with governments necessarily running offsetting surpluses. In this stress phase, labour supply expands as more household debt must be serviced, while natural resources are exploited liberally.

In the normal phase we can represent expenditure on global GDP by two concentric circles (Figure 1), with the outer zone representing private (households' plus firms') claims on

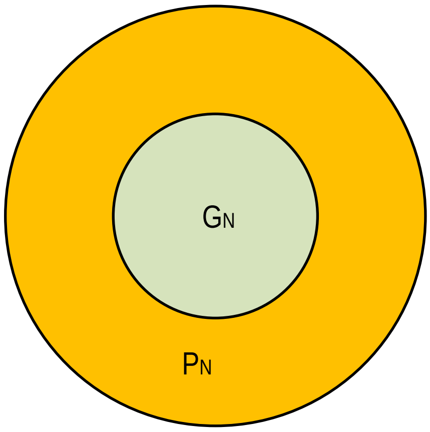
[†] The constraint reflects the widespread view that "rising government debt" leads a "country to ruin" (editorial, *National Business Review* 29 April 2011).

[‡] Strictly, in such a normal state, governments and firms accumulate debt at the rate that GDP increases.

[§] This represents an 'ideal' normal, enabling a contrast to be drawn between normal and stressed states of economic activity. In recent decades, historically high rates of labour force participation may create the impression that highly stressed economies are the 'real world' norm.

GDP (PN) and the inner section representing public claims (GN). In this normal state, private purchases equal private claims, with private claims including transfer and interest flows from governments. Likewise government claims (net of transfers and interest) equal government purchases. Private purchases include firms' purchases of capital goods, and government purchases include a mixture of capital and consumption goods (and services).

Figure 1: Private and Government Expenditures in a Normal Economy



3. Governments as Borrowers of Last Resort

A recession commonly occurs when private purchases fall short of private claims by increased deferral of current claims.[**] Fickle human psychology almost certainly play a role here (Akerlof and Shiller 2009: 4). DeLong (2011: 1) assures us that the implications of excessive demands for financial assets have been understood for nearly 200 years: "Even Jean-Baptiste Say … knew very well that a financial panic and excessive demand for financial assets could produce deficient demand for currently-produced commodities and for labor." Under these conditions the private sector as a whole moves into surplus, making unclaimed goods and services – a leftover slice, following the cake metaphor – available to the remaining sector, the government sector. When there is such a savings glut, governments become the residual claimants, the borrowers of last resort. Governments are ceded the slice of cake left on the table by the private sector. Otherwise the leftover cake is wasted; or is never actually baked, meaning cyclical unemployment.[††]

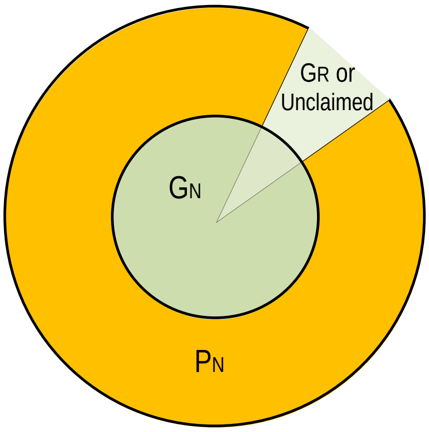
The alternative to governments purchasing all goods and services otherwise unclaimed is a global recession. The problem is that these additional goods and services available to government – the cake relinquished by the private sector – must be accepted as debt, meaning that governments agree to forego some future goods and services that they may otherwise have been entitled to. While they must be paid for by incurring debt, these otherwise unpurchased goods and services are free from the point of view of global society. They are acquired by governments at a societal opportunity cost of zero. Nevertheless those governments least wishing to incur additional debt may prefer other countries' governments to benefit from these otherwise unclaimed goods and services. If these goods offered for sale

[**] Koo (2009: 11), in his theory of "balance sheet recession", emphasises the motive of debt reduction as a private sector response to uncertainty. Debt reduction is of course the debtors' equivalent of increased saving.
[††] Krugman and Wells (2010a and 2010b) discuss the contribution of excess global savings to global recession in a pair of review articles in the *New York Review of Books*.

remain unpurchased, world GDP will decrease, and many people will become unemployed. The private sector cannot achieve its intended surplus unless the public sector, collectively, agrees to run a deficit of equal size.

A recession can be represented as our two concentric circles (Figure 2), with a wedge-shaped slice missing, or partly missing. If governments do purchase this wedge of otherwise undemanded goods and services – as additional government investment purchases, including government-led disaster recovery purchases (GR) – the global economic cake retains its normal size, with the public sector running deficits and the private sector running surpluses. The whole of the wedge in Figure 2 represents government deficit spending, including some normal government purchases (GN).

Figure 2: Private and Government Expenditures in a Potentially Recessed Economy

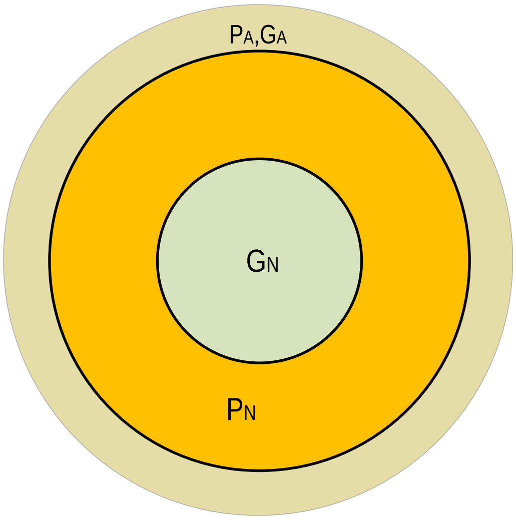


The situation in which governments make up for the otherwise deficient aggregate demand, through purchasing additional goods (GR), represents a form of short-run but not of long-run equilibrium. In the long run, a sufficiency of government spending reanimates Keynes' "animal spirits" (Akerlof and Shiller 2009: 3), enabling a restoration of private spending and the disappearance of the private sector surplus.

4. Stressed Economy

The global economy can go from normal to stressed (Figure 3), either due to governments' and insurance companies' responses to destructive shocks such as natural disasters, or because an unusually optimistic private sector moves into substantial deficit. In that latter case (private-sector deficit) the economy can revert to its normal state if governments run surpluses that offset private-sector deficits. A stressed global economy is not necessarily inflationary, nor necessarily subject to crowding out, as increased output can be enabled by above-normal rates of labour force participation and natural resource exploitation.

Figure 3: Above-Normal Private (PA) and Government (GA) Expenditures in a Stressed Economy



Governments clearly have most money (and other financial assets) in an economy stressed from private sector exuberance, thanks to increased tax revenues. Likewise, due to decreased tax revenues, they have least money in a recession. In a fully stressed global economy, when governments have ample financial resources but there are no physical resources in reserve, the opportunity cost of redeploying goods, services and resources to repair a natural disaster is very high. In a recession, however, the societal opportunity costs of deploying otherwise unclaimed goods, services and resources to repair a natural disaster are practically zero. The opportunity cost of reconstruction from a normal economy is the value of lost leisure as labour supply expands to satisfy abnormally high demands, and the utilisation of non-renewable resources which could otherwise have been saved for the future.

When the global economy is in a normal state, as understood here, the opportunity cost of disaster repair and reconstruction is positive but manageable. In this situation, the opportunity to move from a normal to a stressed state can ensure that goods and services are provided for the disaster zone without a loss of goods and services elsewhere. Increased government (and insurance-facilitated) purchases can be made possible through increases in average hours worked, and increased exploitation of natural resources. Economies in normal states are supply elastic. Already stressed economies are unresponsive to increased demands placed on them; they are supply inelastic.

5. Stabilisation

The macroeconomic role of governments is to operate counter-cyclically with respect to the private sector. A credible and anticipatable commitment to this would mean that the global economy experiences only minor episodes of cyclical stress and recession due to overanimated or underanimated spirits. Stress would come to mean, more usually, temporary periods of natural disaster or war. The global economy would operate in other times at close to its normal size. Periods of government debt expansion – net flows of goods and services from the private to public sectors in excess of purchases funded by taxes and other government revenues – would be offset by equally frequent periods of government debt reduction.To stabilise a world economy that is already in a substantial recession (meaning that the private sector is trying to run large surpluses), such as in 2008-11, governments may run equally large deficits, with zero opportunity cost to the economy as a whole.[‡‡] To stabilise an economy that is already in a substantially stressed state due to the private sector trying to run large deficits, governments may run equally large surpluses in order to de-stress the global economy. Responsible governments therefore acquire more goods, services and resources precisely when they have the least money. When they have the most money they resist their financial opportunities to spend profligately (and crowd out the private sector). This could be called the 'paradox of public finance'.

6. Individual Countries

Is what is true for governments collectively also true for individual governments? Certainly municipal and provincial governments face similar – or even greater – constraints with respect to taking on debt than do households and firms. At the national level, governments with pre-existing chronic debt problems or with weak tax gathering capability[§§] will commonly face resistance from the world's capital markets, and are unlikely to be able to fully participate in our borrower-of-last-resort financing model.

Nevertheless, if we consider a representative national government in a global recession, then that government will both lack money and have otherwise unpurchased domestically produced goods and services available to it. For a large country in recession, for example Japan, it may be possible for its government to substantially meet the repair costs of even a very large disaster from its own country's spare physical resources, even despite an already high level of public indebtedness. Dickie (2011) and Tasker (2011) discuss opposing views on the sustainability or otherwise of Japan's exceptionally high and rising public debt. Tasker notes that "private-sector assets and public-sector liabilities are two sides of the same Godzilla-sized balance sheet".

Even a small country such as New Zealand has had (since 2008) substantial unemployed and underemployed resources within its own territory – even within the city of Christchurch following its destructive earthquakes (Rankin 2011). Nevertheless, because of its size, New Zealand must draw on the spare productive capacity of other countries to facilitate a recovery from such an event. This occurs partly as intergovernmental aid, facilitated by goodwill and reciprocation.[***] It may also occur through international capital markets, whereby the government, acting as insurer of last resort, accesses otherwise unpurchased goods and services from other countries. The New Zealand government may do this through both the sale of foreign-denominated financial assets and increasing its indebtedness to foreign households. Such a process is most constrained in a stressed global economy, and least physically (though more financially) constrained in a period of global recession.

A country such as Australia (with comparatively little domestic unemployment in early 2011), a disaster of proportionate magnitude to say the Christchurch earthquakes, may need to draw (directly or indirectly) relatively more than New Zealand on spare foreign capacity. The important point is that resources that would otherwise be unemployed in some parts of the world may be utilised at little opportunity cost in any part of the world. Direct deployment of

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[‡‡] Clearly, if they end up with unusually high levels of cyclical public debt, then post-recession tax rates will need to be higher than pre-recession tax rates were.

[§§] The 5 August 2011 credit-rating downgrade of the US government by Standard and Poors can be understood as a response to the political difficulties of increasing taxes in the United States.

[***] An excellent example of reciprocation was the dispatch in March 2011 to Japan of a New Zealand Urban Search and Rescue Team following Japan's contribution following the 22 February Christchurch earthquake (New Zealand Herald 2011, New Zealand Fire Service).

foreign resources would mean the import of goods, services or labour for reconstruction purposes. Indirect deployment of foreign unemployed resources would mean that already employed domestic resources would produce more 'reconstruction goods' in lieu of other goods and services, with imports replacing non-disaster goods that are no longer being produced domestically.

Even for a disaster in a very poor country such as Haiti, the opportunity cost to rich-country governments for providing resources for recovery, repair and reconstruction in that country is significantly lower in a global recession than in an overheated global economy. That is true, despite the fact that the world's governments would have had much more money at their disposal had global resources been maximally exploited. Governments or other agencies in Haiti may borrow from (or receive transfers from) governments (or foreign government-supported international agencies) with better credit ratings than the Haiti government, while those stronger governments themselves incur debt in the global financial marketplace. Thus goods and services otherwise unpurchased in Europe (for example) could be consumed where most needed, in Haiti's reconstruction zone.

7. Conclusion

New Zealanders should be able to consider themselves fortunate, given a global recession and hugely destructive earthquakes in Christchurch, that these events coincided. During a recession, the constraints on meeting the rebuilding challenges are financial rather than economic. Governments, in their roles as borrowers and insurers of last resort, face minimal constraints arising from the capacity of the global economy to supply the required goods and services.

Governments find themselves in the paradoxical circumstance of being able to spend, with least crowding out of private spenders, at precisely the times that they have the least revenue and the most debt. Increased government spending at such times is one of the surest means of reviving recessed entrepreneurial spirits. Conversely, increased government spending at times when government revenues are at their highest is highly inconvenient to private spenders. It is in an already stressed economy that crowding out and inflation are most likely to occur, in the event of substantial unanticipated expenditure requirements.

A normal economy, as defined, with labour force participation rates that are not high, and with a conservative rate of exploitation of natural resources, is able to accommodate natural disasters by becoming temporarily stressed. Both normal and recessed economies can be classed as supply elastic, so long as governments are prepared to meet their humanitarian and stabilisation responsibilities, as borrowers and insurers of last resort. The challenges policymakers face are to ensure that governments spend counter-cyclically with respect to their revenues, and to ensure that there can be an unstressed normal state in which human and natural resources are employed sustainably.

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