

**'Of zero value and potentially destabilising': how should we
regulate the carry trade?**

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Abstract: 'Of zero value and potentially destabilising': how should we regulate the carry trade?

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The carry trade, where profits can be made in currency markets using price information alone, has been a persistent anomaly in financial markets since the collapse of Bretton Woods. This thesis outlines how, under free floating currencies, there have been waves of financial crises, financial sector growth has decoupled from GDP, and currency market activity has become increasingly concentrated in a few centres.

The thesis uses the stock-flow consistent or accounting approach to explain the carry trade. Problems with the quality, coverage and timeliness of the SNA and BOP are discussed, with recommendations to improve the data for research into foreign exchange risks. The persistence of high and low interest rate economies is explained with hedge, speculative and Ponzi models of a simple economy. Disaggregating a typical carry trade strategy shows scant evidence for currency market efficiency or a constant risk premium. Rather, there is the impression that international liquidity is a co-ordination problem, and that foreign exchange losses are absorbed by the balance sheets of central banks and exporters. The key features of low interest rate economies are summarised as a Financial Consensus underpinned by a liquidity put from central banks during crises. These findings are consistent with the literature on endogenous money.

Carry trade indices are suggested as a measure of the success of expansionary and contractionary monetary policy. In parallel, deficit countries would need tough fiscal and regulatory policies to tackle stubborn trade deficits, the risks posed by unsustainable external positions, the risks from leveraged offshore finance, profit accumulation and speculative capital flows. The thesis also outlines strategies for countries to resist losses to financial speculators: to move away from inflation targeting, to put in place mechanisms to recycle your own trade receipts, and to settle foreign exchange and derivative trades in domestic currency.

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List of abbreviations

Assets Under Management (AUM)

British Bankers' Association (BBA)

Balance of Payments (BOP)

Capital Asset Pricing Model (CAPM)

Commodity Futures Modernization Act (CFMA)

Currency Composition of Official Foreign Exchange Reserves (COFER)

European Central Bank (ECB)

Expectations Hypothesis (EH)

Efficient Market Hypothesis (EMH)

Exchange-Traded Fund (ETF)

Financial Times and London Stock Exchange group (FTSE)

Financial Transaction Tax (FTT)

Foreign Exchange Joint Standing Committee (FXJSC)

Global Financial Crisis (GFC)

Gross Domestic Product (GDP)

International Clearing Union [ICU]

International Investment Position (IIP)

International Monetary Fund (IMF)

International Monetary System (IMS)

International Financial Statistics (IFS)

Legal Entity Identifier (LEI)

London Interbank Offered Rate (LIBOR)

Mergers and Acquisitions (M&A)

Monetary Financial Institution (MFI)

National Central Bank (NCB)

New Consensus Macroeconomics (NCM)

Organisation for Economic Co-Operation and Development (OECD)

Product Identifier (PI)

Quantitative easing (QE)

Real Estate Investment Trusts (REITS)

Special Drawing Rights (SDRs)

System of National Accounts (SNA)

Treaty on the Functioning of the European Union (TFEU)

Transnational Corporation (TNC)

Tokyo Stock Price Index (TOPIX)

Undertakings for Collective Investment in Transferable Securities (UCITS)

Uncovered Interest Parity (UIP)

World Economic Outlook (WEO)

OVERVIEW

This thesis is a critical examination of currency market regulation since the collapse of the Bretton Woods agreement that culminated in the 'Nixon shock' (Irwin, 2012, p. 1). The main object of study is speculation in the carry trade, also known as 'forward rate bias' (FTSE International, 2010b) or 'forward discount bias'. If you borrow a low interest rate currency and invest in a high interest rate currency, then a large literature has rejected the null hypothesis that 'by arbitrage the forward discount must equal the interest differential. If it did not, then a strategy of borrowing in the foreign currency, changing the proceeds into dollars and then selling the forward would yield a riskless profit' (Froot and Thaler, 1990, p. 182). According to the Efficient Market Hypothesis (EMH), it should not be possible to forecast 'returns with variables like dividend yields and interest rates' (Fama, 1991, p. 1576). There is an assumption that arbitrage will lead to an efficient market by pushing the exchange rate to a new level. However, the fact that the null hypothesis has been consistently rejected is probably the most persistent anomaly in financial markets.

Lord Turner, when he was Chairman of the Financial Services Authority in the UK, said that 'any liquid-traded market which overshoots... can produce resource misallocation or harmful macro volatility. Foreign exchange carry trades are, as far as I can see, of zero value and potentially destabilising' (Turner, 2010, p. 13). This thesis examines whether currency markets overshoot rather than reach equilibrium through arbitrage. The empirical results suggest that carry trades perpetuate global imbalances by undermining monetary policy; central bank intervention then exacerbates these issues. The implication is that the carry trade reflects a failure to regulate speculation in foreign exchange markets, and a failure to co-ordinate international liquidity.

Chapter One provides historical and institutional context. It outlines the development of the International Monetary System (IMS) after the 'Nixon shock'. The pivotal role of lending in US Dollars is explained using a mixture of historical materials, market reports, academic literature and interview data. Following the 'Nixon shock', the Federal Reserve System benefitted initially from rising gold prices, while unregulated speculative capital flows fuelled waves of international financial crises, often following a pattern of boom and bust. Deficit countries like the UK flirted with high interest rates

and monetarism before settling on inflation targeting. Creditor-friendly policies from the Bretton Woods Institutions, and growing US trade deficits, helped Eurodollar and offshore markets to flourish. The conditions were set for the Great Moderation which saw multiple waves of financialisation, accompanied by increased financial leverage and supported by falling interest rates. When the Maastricht treaty came into force on 1st November 1993 there was a surge in bond issuances in Europe, followed by the Asian bubble and dot-com bubble. In the UK, the Great Moderation was characterised by two main waves: the 'Tech Boom' from 1997-2000 and the 'Credit Boom' from 2004-7 (Barwell and Burrows, 2011).

Financial activity is concentrated in key financial centres, with London and a small number of banks handling the majority of foreign exchange trades. Since currency swaps circumvent restrictions on cross-border lending, this creates a particular headache for UK regulators. The picture on cross-border lending is further complicated by tax avoidance. Yet there is evidence that central banks are captured by financial interests, with direct subsidies, barriers to new entrants, price fixing and revolving doors between the regulator and financial firms.

Chapter Two gives a brief history of international regulation, its record in terms of financial stability, and the reform options: capital flow management, reforms to international liquidity provision, better payment systems, transaction taxes and more democratic oversight of the Bretton Woods institutions. Although the Washington Consensus was predicated on three pillars (market liberalisation, privatisation and fiscal austerity), developed economies had never really practised what they preached but have used tariffs, import duties and capital controls to support strategic industries (Chang and Grabel, 2005).

Case studies are examined to show the instability that results when liquidity flows reverse suddenly. Following episodes in Eastern Europe and Iceland, the International Monetary Fund (IMF) relaxed its stance towards acknowledging 'a role for certain measures, such as capital controls, to dampen excessive movement when necessary' (International Monetary Fund, 2010, p. 15). The objective of capital flow management

is to mitigate ‘the predominance of speculation over enterprise’ (Keynes 1936, p. 160) whether through outright bans or taxation.

The regulatory options to manage cross-border flows are investigated using case studies: from the unsuccessful interest equalisation tax in the US to the more recent use of taxes, haircuts, reserve requirements and sterilisation of trade flows. In Europe, the Financial Transaction Tax (FTT) is highlighted to illustrate the resistance to transaction taxes.

Chapter One has already outlined major challenges to the idea that investment markets in general, and currency markets in particular, reach equilibrium: the decoupling of private lending, bond and equity markets from World Gross Domestic Product (GDP); leverage; tax avoidance; offshore finance; and the concentration of asset management in key financial centres with London at the centre of foreign exchange markets. **Chapter Three** extends that discussion to further examples: growth in central bank reserves, currency issue, government deficit spending, major shifts in the yield on bonds and equities and growing profit retention. The idea that financial behaviour changes and is influenced by finance theories is discussed in relation to the Modigliani-Miller theorem.

The model taught in Economics 101 is described to show the importance attached to the interest rate and equilibrium. In particular, the assumption that under inflation targeting the international market for savings and investments will move towards equilibrium is challenged: better, perhaps, to rely on fiscal policy and financial regulation to direct investment towards projects that tackle stubborn problems such as trade deficits, low domestic savings and asset price bubbles. The mixed record of economic forecasting under inflation targeting is illustrated with three examples: inflation forecasts, growth forecasts and exchange rate forecasts. Since the GFC, Quantitative Easing (QE) has taken balance sheet effects into new territory, with spillovers in terms of wealth distribution and asset prices. As an alternative to inflation targeting, the Chapter outlines proposals that monetary policy should target the exchange rate, using a combination of fiscal policy and financial regulation to manage the domestic economy.

The major theories and techniques of modern finance are outlined to illustrate the importance attached in these models to speculation, the assumption there are no limits to arbitrage (liquidity and the existence of a risk-free asset are taken for granted), and the assumption that the future can be predicted from the past. Finally, the carry trade is presented as a counterfactual that undermines inflation targeting, and challenges the idea that markets reach a natural equilibrium.

Chapter Four explains the rationale and motivations for using a class of heterogeneous models known as accounting or stock-flow consistent models:

The thing is to a very large extent an exercise in accounting – or perhaps logic is a more congenial word... our claim is, I suppose, simultaneously a very modest and a very extravagant one. On the one hand we are sorting out a ghastly muddle and showing how, if you set up a complete system with a representation of all stocks and flows in a fully consistent manner, you close down a whole lot of options which otherwise appear to be open. The extravagant claim is to have as it were “swallowed” monetarism, using such insights as it brings to re-establish something very much like the “crude” Keynesian position, by which policy was generally regulated in the 50s and 60s.

(Godley 1983, personal correspondence with Galbraith)

The methodological approach is abductive. A generalised accounting framework allows the researcher to relax their prior assumptions, to explore ‘competing research programmes’ (Lakatos, 1978, p. 69) including New Consensus Macroeconomics and differences in the institutional setting and power relations: they embrace theoretical pluralism. However, accounting frameworks embed a variety of ontological and epistemological priors, including implicit assumptions in the data about the role of foreign exchange prices to ‘clear’ the National Accounts. **Chapters Four** and **Five** make these priors more explicit: in doing so, this shows how the National Accounts can be used to estimate the distributional effects of the carry trade. Post-Keynesian models

were chosen because of the contributions of Kalecki on profit retention, and of Marx on power. These contributions enhance the 'heuristic power' (Lakatos, 1978, p. 98) of the Post-Keynesian approach to explain phenomena such as inequality, leverage, tax avoidance and the growth of offshore banking.

Post-Keynesian models were used by a small group of economists who claim to have predicted the 2008 financial crisis (Bezemer, 2010). The Chapter traces their theoretical origins in Aristotle and Marx; their role in the development of the System of National Accounts (SNA) and Balance of Payments (BOP) Manual; and the later influences of Kalecki, Tobin, and Minsky. Interview and archive material are used to describe how these models were being used at the Bank of England, but fell out of favour in the early 1980s to be replaced by equilibrium models and theories. The successful predictions made by two of these models, developed by Steven Keen and Wynne Godley respectively, are highlighted. These models are examined to illustrate three of their key features: they are heterogeneous, there is no single equilibrium, and the models are constrained by accounting identities that must sum to zero.

Five other key features are discussed: the absence of rational expectations; the non-neutrality of money; liquidity and wealth-constrained sectors; an endogenous theory of money where loans create deposits; and model heterogeneity due to institutional, behavioural and legal differences (including central bank arrangements, modes of financing, and precedence during bankruptcy). The Chapter concludes by describing how this approach to modelling is made easier by recent developments in software tools.

Chapter Five reviews the SNA and BOP to determine what data are needed to better regulate the carry trade. Foreign exchange markets reflect a notable absence in the accounts: essentially, the regulatory data are not 'fit for purpose' to investigate distributional effects because of reporting differences between the SNA and BOP. A proposal to reconcile the two accounts is described in detail, using trade, financial and capital account imbalances as examples. The development of an integrated public ledger with product and legal entity identifiers would allow researchers to unravel the

distributional effects, better monitor systemic risks and measure economic performance. In summary, there is an urgent need for payments system reform.

Chapter Six then builds a stock-flow consistent model that illustrates the emergence of a stable carry trade as a consequence of differences in financing behaviour: hedge, speculative and Ponzi economies. In hedge economies, powerful banks invest surplus loan interest. With speculation, banks lobby to enter investment markets and the system is precariously liquid/illiquid and requires central bank support. In a Ponzi economy, where loans never get repaid, solvency is a balance between increasing reserves, reducing interest rates and central bank support for balance sheets during systemic crises.

The model is calibrated using real economic data. Key ratios for the UK and US (wages to household loans, and household to business loans) show markedly different paths after regulatory and political events such as the collapse of Bretton Woods, the election of Reagan in 1994 and the repeal of the Glass-Steagall Act in 1999. Simulating bank bailouts, household bailouts and a Keynesian boost suggests that bank bailouts are the least effective intervention, exerting downward pressure on wages and household spending: the result is austerity. Central bank policies are not neutral in the model: banks prefer high interest rates and short-term lending; households prefer low interest rates and long-term borrowing.

The model includes a number of liquidity and solvency constraints as a result of the accounting identities. Household spending is constrained by higher interest rates, and there is a minimum interest rate below which banks become insolvent. Financial interests prefer low inflation to maintain their spending power, whereas households prefer high inflation to reduce the size of their debts. Accommodative monetary policy is associated with asset bubbles, speculation in foreign assets and a weak currency: this is in contrast to the idea that domestic investment at low interest rates will lead to economic recovery and a strong currency.

Given the problems with regulatory data, **Chapter Seven** uses an estimation method to unravel these distributional effects for a panel that includes the G5 and China. A return series is generated for a well-known carry trade index, the FTSE FRB5, and disaggregated by sector, currency and currency pair. The excess return when trading

with the central bank is moderately more leptokurtic with more negative skew, supporting the idea that the central bank supports exchange rate as well as interest rate markets. This is consistent with the central bank acting as lender of last resort during crises but responding passively to endogenous demand for money in normal times. The variance and mean of the return series are time-varying, with phases that are similar to the Great Moderation phases described in **Chapter One**. Time-varying and non-Gaussian returns suggest that it is not possible to hedge interest and exchange rate risks during financial crises.

When the return series are disaggregated by currency pair and currency, there is no evidence for a risk premium. Instead, there is clustering with borrowing (short positions) in Sterling and US Dollars at the centre. This suggests that the carry trade represents a co-ordination problem between central banks: currency markets are neither tending towards equilibrium nor self-regulating.

Finally, using indices to estimate the returns to stylised currency baskets, there is evidence of distributional effects. Exporters and central banks have been systematic losers in currency markets: in particular, Japanese and European exporters and Asian central banks. This suggests the winners are those who own financial assets in the UK and US, and these gains were even higher after the GFC. Recent rounds of QE also created opportunities for intra-day arbitrage profits, buying debt out-of-hours when exchange rates are low and selling on to the central bank when exchange rates are high. Together, these findings support the idea that central banks are captured by financial interests who have been able to privatise gains and socialise losses. In comparison with the accommodative behaviour of central banks towards these special interests, other explanatory factors from the literature (size of the economy, trade deficit, size of government debt and productivity) are inconsistent predictors of strong and weak currencies.

Chapter Eight extends the class of models to consider how to model regulatory responses to the carry trade. Financial leverage is modelled, to show how offshore finance can capture dividend and income streams. This suggests a 'lemons problem' if those who originate and distribute are able to collude. With some simple assumptions

it is possible to include the Capital Asset Pricing Model (CAPM) and financial leverage in a single, stock-flow consistent model. However, the model equations rapidly becomes complex when behaviour, taxes, institutional arrangements and balance sheet effects are taken into account.

An examination of flows in export-led and banking-led economies shows how the Washington Consensus emerges. If an export country opens the financial account too soon, financial profits and government loan interest flow abroad in exchange for goods. In this case, capital flow management and the institutional support of a sovereign central bank offer an escape from 'original sin'. When two countries share a currency and central bank but have different trade positions, the impact of fiscal, monetary and wage policies is asymmetrical and irreconcilable without shared fiscal policy.

Modelling government privatisations confirms that this decreases the ability of government to raise tax, and can itself be destabilising. There is a growth effect from government spending which persists for several cycles: so, too, does privatisation as the financialisation of cash flows drives investment-led growth and expands the balance sheet. However, the privatisation model is also unstable: if wages are paid from cash receipts, and the banking sector raises interest rates to attract deposits and tame inflation, there is the possibility of positive feedback on inflation and interest rates. Privatisation raises growth due to investment spending, but a growing service sector makes the model more susceptible to a slowdown in the underlying economy. Third, privatisation leads to a convergence in the model towards a low tax, low growth economy that can be destabilised by high wage and consumption taxes.

Chapter Nine concludes. First, a richer approach to economics modelling is needed to understand the impact of monetary and fiscal policy on the carry trade. Stock-flow consistent models offer a rich framework that can be calibrated to allow for institutional, historical, legal and behavioural differences between countries: these models can reflect actual stocks and flows in a particular context. Economists who used these models 'saw the crisis coming' and they offer useful insights into the

features of developed economies: the carry trade, leverage, the emergence of a Washington Consensus and the undermining of governments through privatisation.

Using estimation methods to unravel the carry trade finds some support for the reform proposals presented in **Chapter Two**. In particular, the benefits of liquidity could be more fairly distributed between domestic sectors (government, household, business and financial) as well as internationally: problems identified in the literature with capital flow management, liquidity provision, payment systems and the democratisation of regulatory bodies exist within as well as between central banks. A key problem is that the carry trade has distributional effects that favour private, financial interests, which central banks could do more to mitigate.

The design of payment systems and international liquidity provision could also be improved, as could the management of interest rate and foreign exchange derivatives during financial crises. The goals of a re-design would be two-fold: to remove domestic support for interest rate and exchange rate speculators, and to better distribute the benefits of international liquidity.

However, empirical evidence to guide policymakers is difficult, because of the notable absence of regulatory data. The SNA and BOP could be better integrated to provide rich data, which in turn could stimulate empirically-driven research into fiscal policy and international financial regulation.

Ethics

Ethics codes pervade the social sciences in general (Bell and Bryman, 2007) and management studies in particular (Brewis and Wray-Bliss, 2008), although the majority of management publications 'fail to examine the issues of corporate social responsibility or business ethics' (Dunne et al. 2008, p. 272). In economics, the 135-year-old American Economic Association did 'not have a code of conduct for its approximately 18,000 members' (Cooke, 2011) until recently. In the United Kingdom, there is no ethics code for members of the Royal Economic Society. Hence the guiding ethical principles were taken from management research.

Common themes in the ethics codes for nine social scientific associations are proportionality and informed consent, the need to avoid harm and to preserve anonymity, dignity, privacy and confidentiality (Bell and Bryman, 2007). For primary interview data, respondents were given a mutual non-disclosure agreement (see **Appendix 2** for the pro-forma). For secondary data, anonymity has been waived where the material is already in the public domain, including published papers, conference proceedings and market data providers. Instead, full academic referencing is used.

This research includes the question 'who benefits from the carry trade?' The emphasis during the research has been on justice: that fair distribution of benefits and burdens such that those who benefit bear the risks, while those who do not benefit do not suffer increased risk. This need for justice is balanced by proportionality: there must be a viable alternative from which the good outweighs harm. The carry trade suggests a wide range of ethical concerns that were drawn into sharp focus by the GFC.

Nomenclature

In the literature, nomenclature is mixed. Sometimes, upper case refers to the 'baseline economy' and lower case to the 'shocked economy' (Fetherston and Godley, 1978). More commonly, upper case refers to 'nominal values' and lower case to 'real values' (Godley and Lavoie, 2007, p. 256; Harrison et al., 2005, p. 30; Lane and Milesi-Ferretti, 2005, p. 10; Santos, 2004, p. 6; Zezza, 2009, p. 21). The convention here is to work with 'nominal values' which are shown in upper case, with the rate of return (interest rate or yield) shown in lower case.

Software

A wide range of software modelling tools are available. The software used by researchers referenced in this thesis include Mathematica (Caiani, Godin, and Lucarelli, 2012, p. 17; Godin, 2012, p. 12), the R package (Herndon et al., 2013, p. p. 11), Excel (Blanchard and Leigh, 2013; International Monetary Fund, 2008 p. 137), Modler (Godley 1999, p. 14) and STATA (Blanchard and Leigh, 2013 p. 7 ; Dube, 2013 p. 4). This thesis uses InsightMaker, an open-source platform supported and hosted by Google, which is designed to visualise stock-flow consistent models: all flows must have a source stock and target stock. It free, simple to use and can be published easily online. There is good graphics support for modelling, to display results, to support difference and differential equations, to run basic statistical functions, to model multiple states and to support a wide user community. However, since InsightMaker has no integration tools for existing datasets, statistical work is done in Excel. The simulations are written in Visual Basic for Applications, although any object-oriented programming language would do.

CHAPTER 1: Beyond the Washington Consensus

Introduction

This Chapter outlines the development of the International Monetary System (IMS) after the 'Nixon shock'. Before the free float era there had been periods of full or partial convertibility into both gold and silver, and the Bretton Woods era is described to illustrate the role of international liquidity and origins of the US Dollar as an international settlement currency.

The immediate effects of the 'Nixon shock' are described, and the idea that markets would reach equilibrium is criticised: the lack of co-ordination has costs for both creditor and debtor and varies depending on their institutional arrangements. Empirical evidence is presented that shows loan, bond and equity markets decoupling from the underlying economy after early experiments with monetarism had been abandoned. In Europe, growth in unconsolidated liabilities has been associated with tax avoidance, and two of these strategies (the Double Irish and Dutch sandwich) are described in detail. Evidence is also presented to show how ownership and control of financial assets has become increasingly concentrated.

There has been a similar decoupling and concentration of foreign exchange activity, with most of the trading activity in London. To illustrate the pivotal role of currency forwards in circumventing capital controls, the pricing of currency forwards with respect to the interest rate differential is described. These pricing models rely on a no arbitrage assumption, the failure of which underpins a vast array of potential carry trades.

The parallel growth of financialisation with cheap interbank lending is described next. In particular, there has been rapid growth in household lending, private equity, commercial real estate, interbank and intra-bank lending. Then, when the GFC hit, central banks intervened; critics argue that much of the new liquidity went straight into new carry trade strategies. Lastly, the role of the central bank as lender of last resort is critically reviewed. Using a framework developed by Stigler, central banks are assessed to understand the extent to which they have been 'captured' by powerful, financial interests.

The Bretton Woods era

A fundamental problem for international trade, in real and financial assets, is the choice of currency for final settlement. Prior to World War I there had been periods of convertibility into both gold and silver but 'the adoption of the Gold Standard was a gradual process. There was no international legal foundation – no treaties, agreements or conferences' (D'Arista, 2009, p. 635). World War I destabilised this system with war reparations, reconstruction costs and deficit spending pushing 'the European belligerents off the gold standard' (Mundell, 2000, p. 328). Certainly, gold became scarce: it increasingly accumulated in the United States under the Federal Reserve System which had been established in 1913. This accumulation was driven by US trade surpluses that continued throughout World War 1, peaked in 1919 and again in 1928 (US Department of Commerce, 1970, p. 884).

The interwar period was also a period of competitive currency depreciations, protectionism and exchange rate volatility (Wang, 2005). While creditor countries like the United States were accumulating gold, debtor countries needed to settle World War 1 reparations that had been fixed in gold. Under a partial gold standard, this double squeeze put international liquidity under pressure. In Germany, the notorious hyperinflation of the Weimar Republic from 1921-23 has been described as 'the best response available to the German government in the face of politically unsupportable demands for reparations' (Laidler and Stadler, 1998, p. 829) and laid the foundations for the rise of the Nazi party: Germany had seen the gold value of fiat currency collapse 2500-fold and the figures for Austria and Russia 'exhibit the same general features' (Keynes, 1924, p. 53). After the collapse in Central Europe of Viennese Creditanstalt in 1931 'a large number of other countries followed Britain off gold' (Mundell, 2000, p. 329). It was against this backdrop of 'unprecedented violence' (Keynes, 1924, p. 2) in fluctuations of the value of money and the horrors of World War II that the Bretton Woods agreement was reached.

Bretton Woods sought to re-introduce the stability of the gold standard without the international liquidity constraints that followed when gold was either hoarded or in short supply. Instead, the system relied on confidence in the US Dollar as the ultimate settlement currency. The US Dollar was valued at a fixed rate of 35 US Dollar per ounce

of gold and other currencies declared a par value to the US Dollar with a one per cent margin either way. The Bretton Woods institutions – the World Bank and the International Monetary Fund (IMF) – were established to regulate and oversee this agreement. A country could change the par value of its currency ‘in the event of a fundamental payments disequilibrium... the Fund would not disapprove the change if it was less than ten per cent and, if it was more than ten per cent, the Fund would decide within seventy-two hours’ (Bordo, 1993, p. 35). International goods could be exchanged for domestic fiat currencies, secure in the knowledge that fiat currencies could be exchanged for US Dollars at par, and that US Dollars could be exchanged for gold in Washington.

In practice, countries were excluded from or dropped in and out of the Bretton Woods agreement. Japan did not become convertible until 1964; and most Western European countries did not become convertible until 1958 (Bordo, 1993, p. 4). The core stability of the system relied on the United States running a primary trade surplus, which it did every year from 1941 to 1970. However, the quantity of US Dollars in offshore circulation was also growing rapidly and the ratio of gold backing these US Dollars had fallen from fifty-five per cent in 1970 to twenty-two per cent by 1971 (Wang, 2005). In particular, there had been large outflows of gold from the United States in 1965, 1967 and 1968 (US Department of Commerce, 1970, p. 884). This leakage of gold from the Federal Reserve System was mirrored by a four-fold increase in the assets and liabilities of Eurodollar banks between 1966 and 1970 (Friedman, 1971, p. 16). Offshore US Dollars were favoured by Russia because of the risk that domestic US Dollars would be impounded, and Eurodollar banks grew as a consequence of Regulation Q (a ceiling on deposit rates) and the interest equalization tax which the US had hoped would stem the outflow of US Dollars by shifting ‘a significant component of world portfolio and short-term borrowing from New York to Europe’ (Hawley, 1987, p. 47).

The free float era

A new era began when President Nixon acted to stem this outflow of US Dollars ‘by closing the gold window (ending the ability of foreign central banks to convert their dollar holdings into gold)’ on 15 August 1971 (Irwin, 2012, p. 1). This marked the

ending of a managed international payments system. Any pretence that international liquidity was underpinned by gold, or that foreign exchange markets were regulated by the Bretton Woods institutions, was swept away. The IMS had undergone a fundamental change without any global agreement as to what that meant, nor any discussion about what to do if private banks were unable to settle international payments. What was supposed to happen was that international trade would be settled with a mix of fiat currency, bonds, equities and capital assets flowing in the opposite direction. The market would reach equilibrium:

Equation 1.1: current account balance + capital and financial account balance + official reserves = 0

Under full liberalisation, foreign creditors could also buy fixed capital assets in the debtor country, such as land, property and mineral rights: a topic that is expanded in **Chapter Three**. Rebalancing was supposed to occur through the exchange rate and interest rate: the deficit country would have a weaker currency, making exports cheaper and imports more expensive (Jomo and Fine, 2006) and leading to investment in domestic production until equilibrium was re-established, perhaps after a lag of one or two periods. In fact, the US and some other developed economies began to accumulate very large trade deficits, largely at the expense of exporters like Japan and Germany:

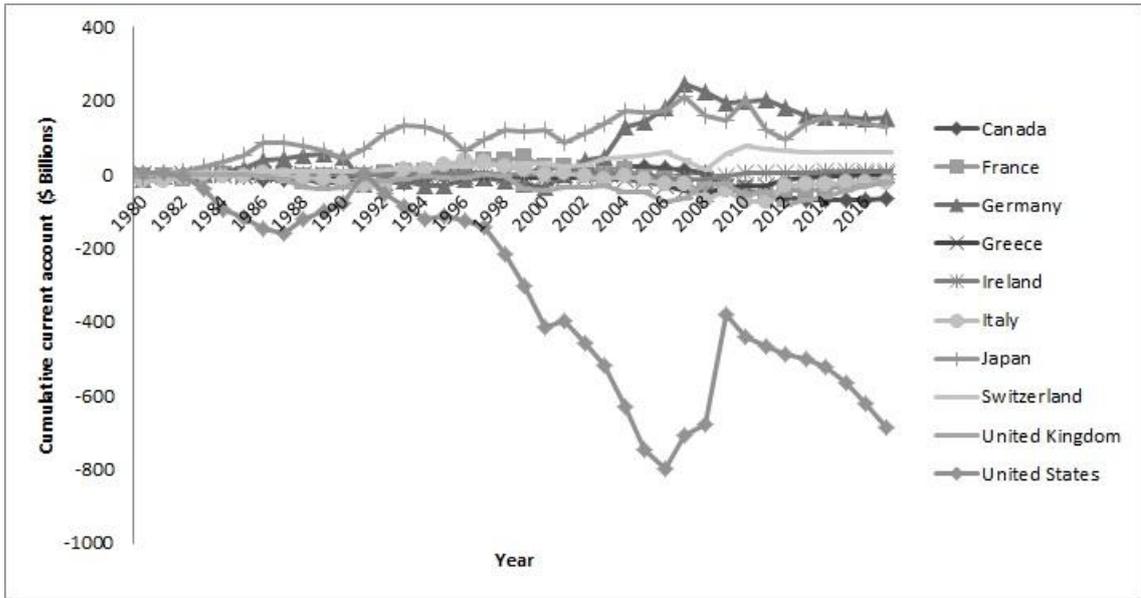


Figure 1.1: Current account balances for the US and other developed economies from the IMF World Economic Outlook (WEO) database.

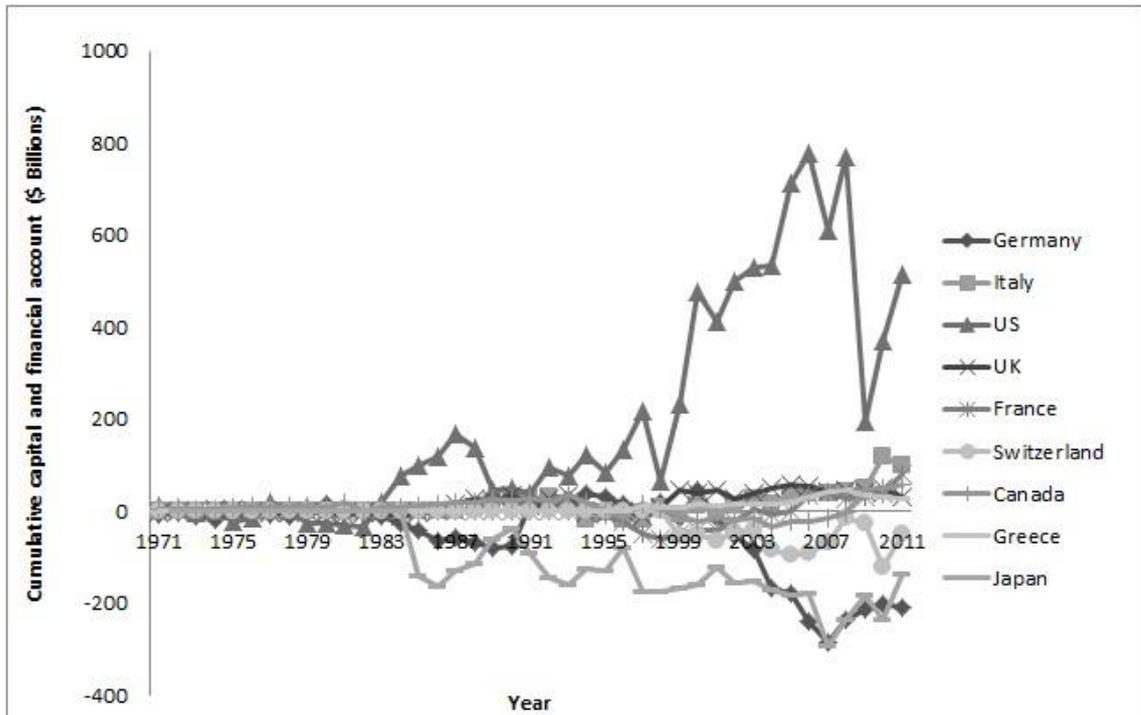


Figure 1.2: Combined financial and capital account balances for the US and other developed economies from the IMF WEO database.

In the words of an anonymous UK central banker, the free float era broke new ground and nobody knew what to do:

People didn't know how floating exchange rates were going to work, really, other than that financing fixed exchange rates was proving very difficult... and very quickly after ... the breakdown... there came the first oil shock and that then opened, you know, produced a whole load of other sets of issues making balance of payments financing much worse... I mean much more problematic because the balance of payments, current account deteriorated and the, you know, the arrangements to recycle capital flows weren't in place, so that by '74 the imbalances became so big that the IMF decided to create a special finance facility to collect funds from the oil countries and lend them to the deficit countries, whoever they were.

2012 interview with UK central banker ALLADIN

Financial crises

However, President Nixon's decision did solve an immediate problem for the US. The price of gold skyrocketed from 35 US Dollars to 600 US Dollars an ounce in 1980, and the US held about one quarter of the world's supply that was worth about 160 billion US Dollars at the peak (Graeber 2011, p. 361-2). The Federal Reserve System was, once again, well capitalised.

However, with the free float era came a wave of financial crises as private, international lending grew. 'It is striking from the data that no financial crises happened during the Bretton Woods years of tight financial regulation and capital controls in the years from WW2 until the mid-1970s' (Jorda, Schularick, and Taylor, 2010, p. 2). After the Nixon Shock the crises that followed included a surge in bank loans to Mexico in the 1970s; real estate and stock bubbles in Japan, Finland, Norway and Sweden from 1985-9; real estate and stock bubbles in Thailand, Malaysia and Indonesia from 1992-7; a foreign investment bubble in Mexico from 1990-9; a stock bubble in the US from 1995-2000; real estate bubbles in the US, Britain, Spain, Ireland and Iceland from 2002-7; and the Greek government debt crisis (Kindleberger and Aliber, 2011).

Capital flow 'bonanzas are no blessing... in the case of (emerging economies) bonanzas

are associated with a higher likelihood of economic crises (debt defaults, banking, inflation and currency crashes). Bonanzas in developing countries are associated with pro-cyclical fiscal policies and attempts to avoid an exchange rate appreciation... for the advanced economies... bonanzas are associated with more volatile macroeconomic outcomes' (Reinhart and Reinhart 2008, p. 1). While this has particularly been the case for developing and emerging economies, where volatility has historically been higher, the pattern is consistent across large sample sizes and time periods.

Financial crises are by no means the same, but a common pattern when the bubble bursts is that debt payments became too large to service out of income flows and the cost of borrowing rises as short-term capital flows dry up or reverse. In Latin America, from the mid-1970s, large amounts of debt were accumulated in US Dollars and there was a double whammy from interest rates and exchange rates. The interest rate rose under the Volcker shock in the US (Vasudevan, 2009, p. 296) which succeeded in its short-term domestic objectives since private capital flows to the United States increased and the US Dollar stabilised. However, countries that had borrowed US Dollars in newly-formed private capital markets were hit by higher interest rates that could 'be paid only by increasing exports' (Kregel 2008, p. 547). Lending came to an 'abrupt halt' with suspension of interest payments in Mexico, Brazil, Argentina, Venezuela and the Philippines and the negotiation of the Brady Plan in 1989, after which 'a second wave of private capital inflows to the emerging markets was set in motion' (Vasudevan, 2009, p. 297). 'The problem was that much of this investment was "hot" money, placed in shares and bonds. It could leave as fast as it came' (Reid, 2009, p. 138).

A lack of co-ordination

Hence, the period after the Nixon Shock saw rapid growth in the private provision of international liquidity, but without any co-ordination should imbalances arise: instead, adjustment occurred as a result of crisis. Keynes's biographer, Lord Skidelsky, argues that growing imbalances with the US are the reappearance of an ancient problem where surplus countries can accumulate trade receipts without any 'upper limit':

The process of adjustment is compulsory for the debtor and voluntary for the creditor. If the creditor does not choose to make, or allow, his share of the adjustment, he suffers no inconvenience. For whilst a country's reserves cannot fall below zero there is no ceiling which sets an upper limit. The same is true if international loans are to be the means of adjustment. The debtor must borrow; the creditor is under no... compulsion (to lend).

(Keynes, 1980, p. 28) quoted in (Skidelsky, 2010, p. 8)

However, this misses a key insight, which is that private, offshore banks had no shortage of deposits when the US economy began to run trade deficits. The absence of an 'upper limit' on reserve accumulation is matched by an absence of an upper limit on private deposits (and therefore private banks) if the foreign sector prefers to accumulate money offshore. As there were no longer arrangements under the Federal Reserve System to exchange US Dollars for gold, or for any other currency, there was no implicit reason for trade deficits to be recycled via the Federal Reserve System. A surplus country might prefer to hold offshore deposits or US Treasury Bills, or (if the institutional arrangements exist) to exchange US Dollars for domestic currency via their own central bank. Under these institutional arrangements, and provided US Dollars are accepted for international settlement, there are few limits on the amount of private and public debt that the US can issue: the process of adjustment is now reversed, and is voluntary for the debtor and compulsory for the creditor. It is the creditor who must find other ways to settle international trade to avoid accumulating US Dollars.

Growth in bond and equity markets

A decoupling of growth in private, financial assets from the wider economy is consistent across bank lending, bond markets and equity markets. **Figures 1.3** and **1.4** show growth in private, unconsolidated liabilities across a panel of developed economies, as a percentage of Gross Domestic Product (GDP). Unconsolidated refers to the fact that assets and liabilities have not been netted within the sector. Portugal, Italy, Greece and Spain begin the period with the lowest unconsolidated liabilities in

the panel. In the years for which data are available, Luxembourg increases unconsolidated liabilities at twice GDP every year (between 2006 and 2011) and Ireland increases unconsolidated liabilities at once GDP every year (between 1995 and 2011). Excluding Luxembourg and Ireland, total unconsolidated liabilities to GDP rise across the panel from an average of seven times GDP to around eleven times GDP in just six years.

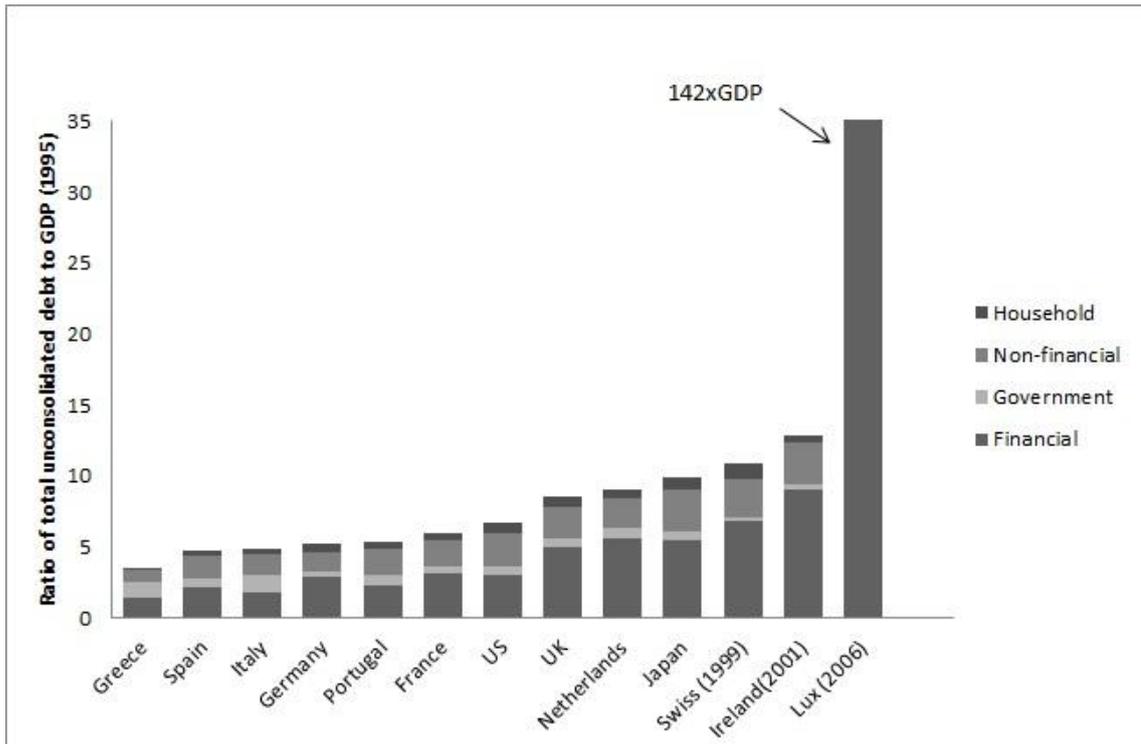


Figure 1.3. Household, non-financial, government and financial unconsolidated liabilities across a selection of developed countries as a percentage of GDP. Data from OECD National Accounts (Datastream). Data from 1995 unless otherwise indicated.

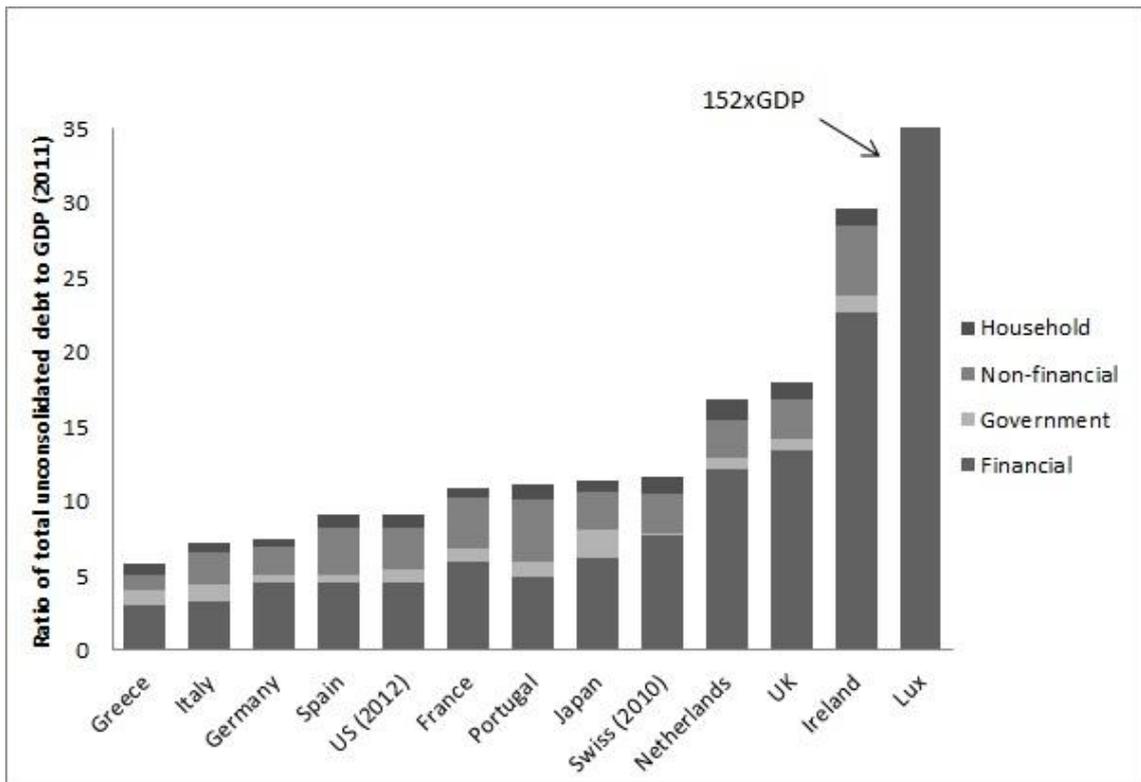


Figure 1.4. Household, non-financial, government and financial unconsolidated liabilities across a selection of developed countries as a percentage of GDP. Data from OECD National Accounts (Datastream). Data from 2011 unless otherwise indicated.

A major factor behind the growth in unconsolidated liabilities is tax avoidance. Critics estimate that may be more than \$32 trillion of unreported wealth held in offshore tax havens (Tax Justice Network, 2012) as outright tax evasion, but there are also legitimate tax avoidance schemes that rely on lending and transfer payments between a myriad of legal entities.

There are two steps to tax avoidance for US firms that operate in Europe: the Double Irish and Dutch sandwich (Bank, 2013). The Double Irish gives the US firm a foothold in Europe. Two Irish companies are created, one of which is domiciled offshore (normally Bermuda) and is paid a royalty or intellectual property fee by the Irish company. The Bermudan company is considered to be Irish (by the US) but Bermudan (by the Irish) so does not pay Irish taxes. The Irish company does not pay taxes either, provided the royalty payment to the offshore company is sufficiently high that the Irish company does not make a profit. The balance sheet in Bermuda has an asset (intellectual property) and a liability (the debt used to purchase the asset). The balance sheet in

Ireland has a liability (a stream of royalty payments) and an asset (equal to the offshore liability).

The second step is the Dutch sandwich to avoid taxes on the royalty payments to the Bermudan company. Payments to the Bermudan company are routed via a Dutch subsidiary or parent. This second payment is tax-free because it is an intra-European transfer, but the Dutch company does not pay withholding tax on the Bermudan royalty payment under Dutch law. The net effect, colloquially referred to as 'Double-Dutch Irish sandwich' (Daily Telegraph, 2012), is that neither the US parent nor the Irish subsidiary are paying taxes on their European operations. At a global level, these profit-shifting strategies are estimated to result in a tax loss to developing countries of 160 billion US Dollars although 'the research approach presents some data and methodological challenges' (Jansky and Prats, 2013, p. 6).

With profits flowing offshore, this wealth provides new assets as collateral for further lending, and offshore balance sheets grow further to the benefit of a privileged group, exacerbating inequality. When this offshore wealth accumulation is accompanied by lower consumption in the domestic economy, growth in the domestic economy is also subdued. Hence any theoretical framework needs to accommodate a plethora of challenges: tax avoidance, subdued growth and financial fragility due to the higher leverage.

Within equity and bond markets, there are also dramatic shifts in private capital flows. The World Federation of Exchanges publish data on equity and bond market capitalisation and issuances since 1975 (data for 1990 are not available) and these show a dramatic expansion of balance sheets within Europe when the Maastricht treaty came into force on 1st November 1993. There was a surge in bond issuances, with the Deutsche Börse and London Stock Exchange accounting for the majority: almost five trillion US Dollars of bonds were issued on the Deutsche Börse and over two trillion US Dollars on the London Stock Exchange in 1993, with total bond issuance that year approaching half of World GDP:

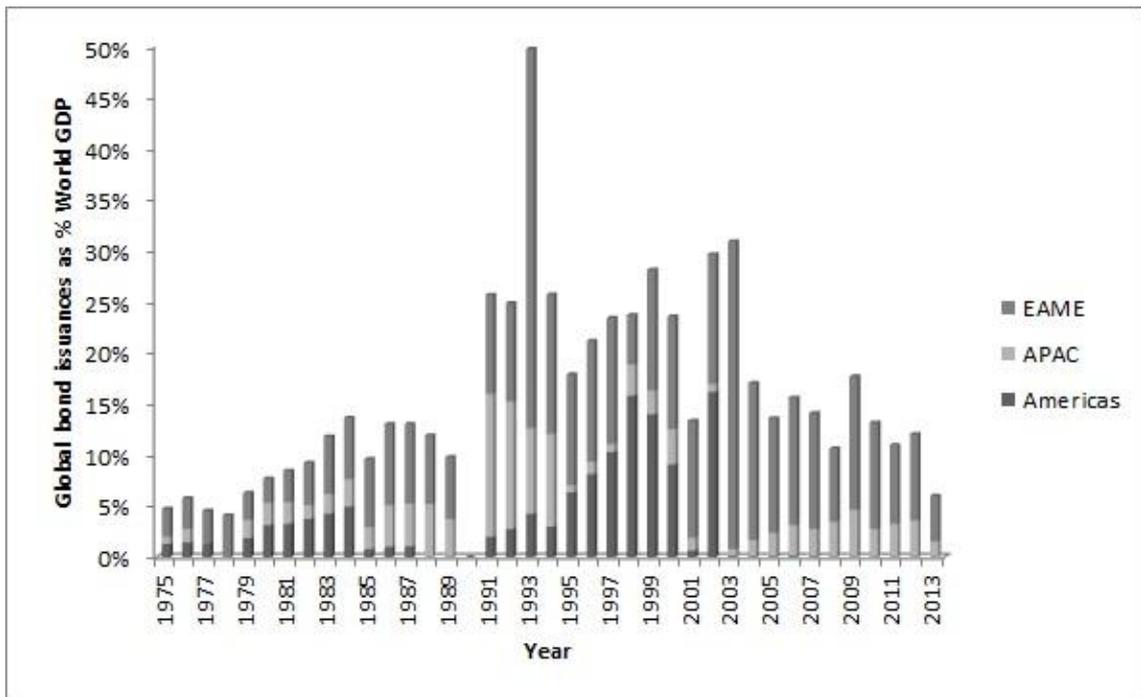


Figure 1.5. Global bond issuances (World Federation of Exchanges Statistics) as a percentage of GDP (World Bank).

Was this explosion of new lending to fund investment in new production, or to fund speculation in existing financial assets? The regulatory data do not show (a problem that is discussed in more detail in **Chapter Five**) but **Figure 1.6** shows that 1993 also marked the beginning of a surge in world equity markets: from 1993 to 2000 the Asian bubble and the subsequent dot-com bubble saw an increase in global equity market capitalisation equivalent to eighty per cent of World GDP. In 1993 there were huge shifts in equity market capitalisation in Singapore (171 per cent), Malaysia (141 per cent), Buenos Aires (137 per cent), Hong Kong (124 per cent), Thailand (124 per cent), Taiwan (93 per cent), Tel Aviv (71 per cent) and New Zealand (67 per cent). There were market capitalisation increases in every equity market in 1993, after accounting for changes to the reporting of the NASDAQ OMX exchanges. For the period 1990 to 2000, global GDP increased at a compound annual growth rate of five per cent compared to 9.1 per cent for equities and 8.2 per cent for debt (Haslam et al. 2012, p. 8) driven by 'low interest rates coupled with adjustments to regulatory frameworks and the evolution of financial innovation... (the) capitalisation process becomes self-sustaining

and increasingly decoupled from cash/earnings extraction capacity' (Haslam et al. 2012, p. 18):

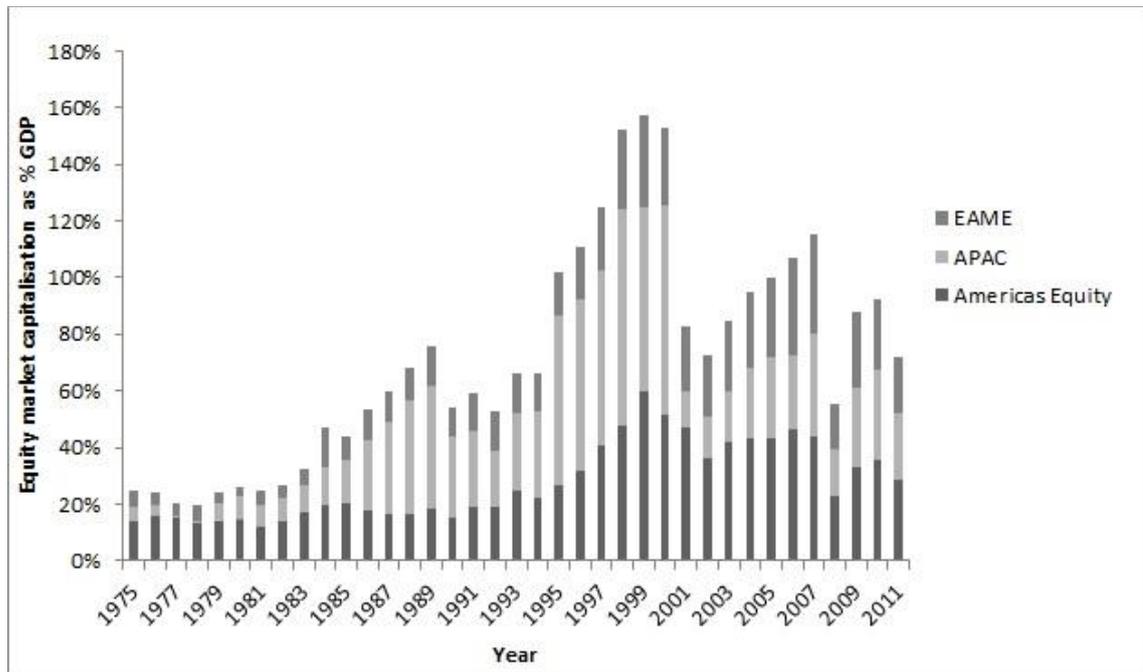


Figure 1.6. Equity market capitalisation (World Federation of Exchanges Statistics members and non-members combined) as a percentage of GDP (World Bank).

These surges in bond issuance, private lending and equity markets suggest that regulators need to take account of a much wider set of financial assets and activities than the banking sector. Leverage and speculative capital flows are as much a risk to financial instability as domestic lending, and wealth concentration increases the possibility of collusion, anti-competitive behaviour and fraud.

Estimating concentration within the financial sector is difficult but not impossible. Open corporates publish free, on-line network diagrams to show the ownership links between public companies (Open Corporates, 2014). Tracing the general pattern of ownership connections between Transnational Corporations (TNCs) is fraught with problems such as recursion, cross-shareholdings and indirect ownership; the evidence suggests a high degree of concentration where 'nearly 4/10 of the control over the economic value of TNCs in the world is held... by a group of 147 TNCs in the core, which has almost complete control over itself' (Vitali et al., 2011, p. 4). **Table 1.1** shows

that the top fifteen TNCs are fund managers or combined fund managers and investment banks:

TNC	Location	Cumulative control (per cent)
Walton Enterprises LLC	US	23.56
Credit Suisse Group	Swiss	22.81
Franklin Resources Inc	US	21.99
Deutsche Bank AG	Germany	21.17
Wellington Management Co LLP	US	20.33
Merrill Lynch and Co Inc	US	19.45
UBS AG	Swiss	18.46
Vanguard Group Inc	US	17.25
Legal and General Group	UK	16.02
J.P. Morgan Chase	US	14.55
State Street Corporation	US	13.02
Axa	France	11.21
FMR Corp	US	8.94
Capital Group Companies Inc	US	6.66
Barclays PLC	UK	4.05

Table 1.1. Top 15 TNCs. Source: (Vitali et al., 2011, Appendix S1, Table S1)

The growth of third party asset management has, paradoxically, concentrated ownership. Prior to high profile cases such as Robert Maxwell who ‘routinely used assets of the Mirror Group’s pension plans to finance his corporate manoeuvres’ (Clark, 2010, p. 222), funds were more likely to be managed actively. Passive management or index-tracking fund invests funds according to an external benchmark, which usually reflects the market capitalisation of a broad set of constituent assets in a sector or country. Passive management expanded from the 1970s and had a 13 per cent market share at the end of 2005 (Pastor and Stambaugh, 2012, p. 743). The

associated voting rights are exercised by the third party asset manager, not by the investor.

Within asset management, there has been a tendency for smaller funds to disappear due to the selective culling of underperforming funds (Elton et al., 1996) as well as Mergers and Acquisitions (M&A). The tendency for larger funds has been encouraged by such regulations as the Europe single market. The intention of the Undertakings for Collective Investment in Transferable Securities Directive (UCITS), which began in 1985, was to create a single market for asset managers across Europe; it also created problems in cross-border regulation and opportunities for regulatory arbitrage. The UCITS *cause célèbre* was Bernard Madoff's asset management firm, revealed in 2008 as a massive Ponzi scheme. The firm had been UCITS registered in Luxembourg and was responsible for 'allegedly the largest investor fraud ever committed by an individual' (Weber and Gruenewald, 2009, p. 1). In Luxembourg, local regulations permitted custody of the non-existent assets in the United States without direct surveillance.

Around two-thirds of global Assets Under Management (AUM) are long-term investments managed on behalf of households by pension, insurance and mutual funds, but the remaining one third are managed on behalf of wealthy individuals and sovereigns in private wealth, sovereign wealth, private equity and hedge funds (TheCityUK, 2012, p. 1). Not only have equity ownership interests become concentrated institutionally and with wealthy individuals, their management is concentrated geographically such that almost half the asset managers are US firms, with clusters in global financial centres such as New York and London (TheCityUK, 2012, p. 4).

Currency market concentration

Alongside this huge growth in private lending, bond and equity markets, there has been increasing concentration of foreign exchange trading such that 'in April 2013, sales desks in the United Kingdom, the United States, Singapore and Japan intermediated 71 per cent of foreign exchange trading, whereas in April 2010 their combined share was 66 per cent' (Bank for International Settlements, 2013, p. 3): 41 per cent of this was in the United Kingdom. At the same time, a declining number of banks account for the majority of foreign exchange turnover: eight banks accounted

for 75 per cent of foreign exchange turnover in the United Kingdom in 2010 (King and Rime, 2010, p. 29). Four banks – Citi, Deutsche, Barclays and UBS – accounted for over half of the market share by customer volume in 2013 (Euromoney, 2013).

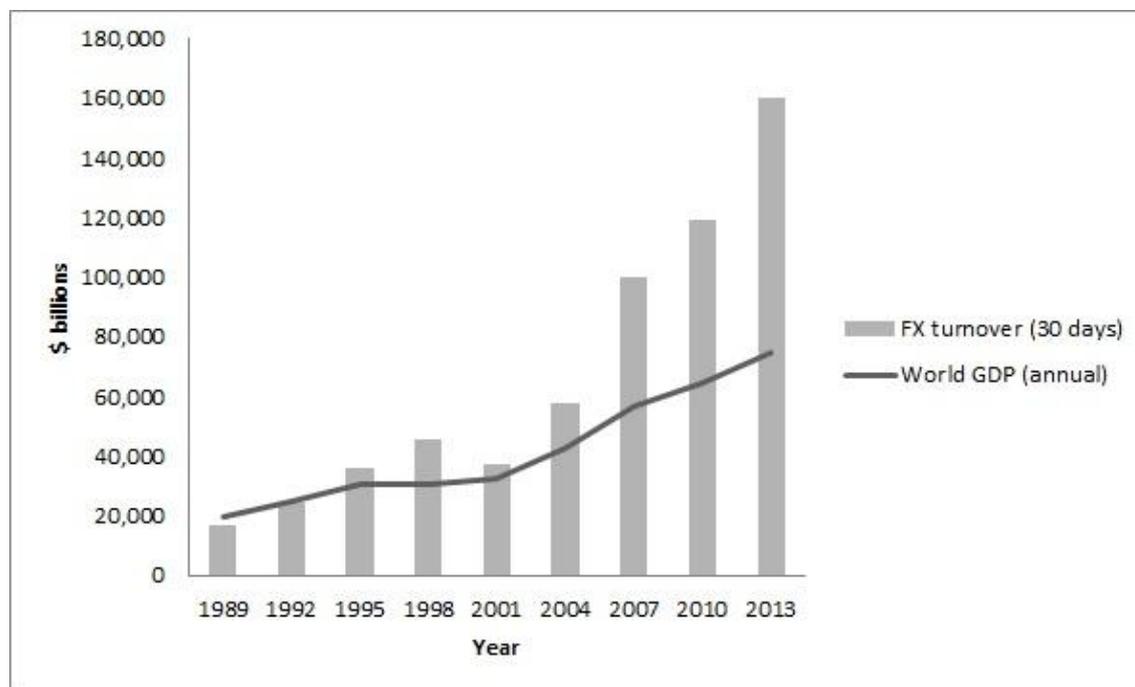


Figure 1.7. Nominal foreign exchange activity (BIS Triennial Surveys) compared to GDP (World Bank).

The historical reasons for London’s dominance of foreign exchange markets are the topic of a different thesis. However, currency markets are critical to the development of cross-border lending and borrowing. A simple currency swap first made its appearance after World War II ‘as a way to get around post-war controls on international capital flows’ (Mehrling, 2011, p. 71). Swaps could circumvent regulatory constraints because they were implicit loans and not actual loans. They are not treated as loans for regulatory purposes, which gets around banking requirements such as the reserve ratio. If there is no regulatory requirement to back implicit loans with domestic government bonds, then the relationship between government debt and private debt is broken and there is nothing to stop private debt rising at a rate much higher than GDP (as shown in **Figures 1.2** and **1.3**). In turn, this undermines both the government’s ability to borrow and the central bank’s ability to manage liquidity.

In theory you can swap anything in the derivatives markets, but a simple currency swap links both the principal and interest payments: in effect, a loan in one currency has been substituted for a parallel loan in another currency. The pricing of these swaps was 'organised around... an idealised norm that economists call Uncovered Interest Parity (UIP)' (Mehrling, 2011, p. 76). In other words, foreign exchange rates and interest rates are inextricably linked according to a free market ideal as theorised by Keynes in his 1924 'Tract on Monetary Reform'.

Keynes believed that this free market ideal would depend on other factors: regulatory risks, political risks and the ability of the bank to find the other side of the trade. However, if 'our assumption of a large and free market breaks down' abnormal profits are possible, such as when 'floating capital... is not always adequate to the market's requirements' (Keynes 1924, p. 129). This 'abnormal discount can only disappear when the high profit of arbitrage between spot and forward has drawn fresh capital... it is interesting to notice that when the differences between forward and spot rates have become temporarily abnormal, this indicating an exceptional pressure of speculative activity, the speculators have often turned out to be right' (Keynes 1924, p. 130).

Mathematically, the price of a currency swap assumes there is no arbitrage between interest and exchange rates: the currency forward (or swap) is priced according to the spot price and the interest rate differential between the two countries. If, for example, the interest rate in the US equals $i_{\$}$ and the interest rate in the UK equals $i_{£}$ then the price for the currency forward is given by the following equation:

$$\text{Equation 1.1: } F_{t+1} = S_t \left(\frac{1+i_{\$}}{1+i_{£}} \right)$$

Where F_{t+1} = the forward price from US Dollars to Sterling; S_t = the spot price from US Dollars to Sterling; $1 + i_{\$}$ = the US interest rate per annum; and $i_{£}$ = the UK interest rate per annum.

In other words, if the spot rate is 1.0000; the US interest rate is two per cent per annum; and the UK interest rate is five per cent per annum:

$$\text{Equation 1.2: } F_{t+1} = 1.0000 \left(\frac{1.02}{1.05} \right) = 0.9714$$

Then the one year forward rate is 0.9714 – it will cost you 0.9714 US Dollars (today) to buy a contract that delivers £1 (in one year). The no arbitrage assumption is that it makes no difference whether you borrow US Dollars or Sterling. Borrowing one US Dollar will cost you 1.02 US Dollars after one year, or borrowing £1 will cost you £1.05 * 0.9714 = 1.02 US dollars: exactly the same.

If the term of the loan and currency forward are different, such as a one month currency forward and a one year loan, then the yield curve comes into effect and you pay a risk premium: there is an assumption that liquidity comes at a price. If you have a right to buy liquidity that is a liquidity call and if you have the right to sell liquidity that is a liquidity put. Under the Expectations Hypothesis (EH), the no arbitrage assumption is that a series of monthly forward contracts has the same return as a one year contract minus a risk or liquidity premium. **Equation 1.2** shows the implied, no arbitrage relationship between the monthly and annual returns:

$$\text{Equation 1.3: } (1 + r_y)^t = (1 + r_{m1})(1 + r_{m2}) \dots (1 + r_{mt}) + \pi^t$$

Where r_y = interest rate for one year; r_{m1} = interest rate for month one; r_{m2} = interest rate for month two; t = one year; and π^t is the price of the liquidity option

If all contracts have the same term (they are all one month or one year) then these no arbitrage assumptions predict that the liquidity premium is the same between and within currencies. This is a key insight to the empirical work in **Chapter Six**, which compares the carry trade returns in an overnight and one month market. Provided everything else is the same – collateral arrangements, counterparty risk, underlying asset risk (the difference between investing in bonds or equities) and the term structure, the no arbitrage assumption predicts that the carry trade return will also be the same: any differences in the carry trade across different asset classes would therefore be of interest in terms of regulation and financial stability. That is the purpose of **Chapter Six**, which compares the returns from three carry trades: i)

borrowing and lending in one month interbank markets ii) borrowing and lending overnight with the central bank and iii) using one month currency forwards.

There are many potential carry trades between asset classes and for different contract periods, making this a rich area for empirical research. The bond issuance example given earlier is a case in point. If only a tiny proportion of the money raised by bond issuance in Europe had led to secondary investment in equities in APAC, the net effect would have been a carry trade using cheap funding in Europe to buy higher yielding equities abroad. Exactly who are the winners and losers from such carry trades is unclear: it depends whether the exchange rate risk was covered by buying a currency forward, in which case the seller of the currency forward wins, or uncovered, in which case the speculator on APAC equities wins.

With the currency market highly concentrated and dominated by four banks in London, the risks of the carry trade are particularly important to financial stability in the UK. According to a respondent who works for a currency manager, buying and selling forward contracts from these four banks, the price of currency forwards was largely determined by the interest rate differential until the Global Financial Crisis (GFC) hit in 2007:

Well there is, I mean, to be fair, there is one thing that's changed about forwards since 2007... traditionally it's been covered interest parity where the interest rate differential... is implied by the forwards ... but since 2007, the forward contract also incorporates basis risk as well, which is essentially a credit risk... banks are not risk free anymore, well, they never were anyway, obviously, but there's a risk that reflects the counterparty risk... ahm... i.e. the risk of the counterparty not fulfilling their side of the contract.

2012 interview with FX Manager SPACEMAN

This reference to basis risk and counterparty risk is especially telling. The fact that the currency forward price assumes no arbitrage between interest rates and forward

exchange rates is, with hindsight, quite remarkable: the counterparty risks are very different. If speculators had managed to acquire fifty per cent of World GDP in 1993 (in Euros or any other currency) to invest in foreign equities the carry trade risks would have been huge, and the outcome very different if the currency risk was covered in the currency forward market (and foreign exchange profits and losses accrued within the banking sector) or uncovered.

Within the banking sector, counterparty risks also vary between countries. For example, does the central bank act as lender of last resort and bailout the banking sector? Is the IMF called in and the domestic loan book restructured with higher interest rates that return the banking sector to profitability, or lower rates that benefit the debtor? In other words, can high and low interest rate economies persist for long periods because of institutional and behavioural differences? This question is explored more fully in **Chapter Seven**.

Financialisation-led growth models

The evidence is that the collapse of Bretton Woods, subsequent rise in the gold price and growing offshore US Dollar deposits led to rapid growth in financial markets. Initially, there were no mechanisms in place to recycle US Dollars and this void was filled by an offshore banking system that had emerged from the Eurodollar banks. International liquidity had been privatised.

Many commentators regard the free float era as a success for developed economies because the central problems of growth and inflation appear to have been tamed. 'The period since the breakdown of the Bretton Woods system has been one of exceptional growth in the world economy' (Aliber, 2011, p. 341) and the 'outstanding achievement (of this period) was the taming of inflation' (Reid, 2009, p. 151). However, the immediate aftermath of the Nixon Shock was a period of high inflation and the solution, at least for a while, was to ensure stability by managing growth in the money supply (monetarism). 'Management of the rate of growth of the money supply is one of the most effective measures available to government leaders as they seek increased support from their constituents' (Aliber, 2011, p. 339).

This idea began in the UK in the 1960s under the 'Medium Term Financial Strategy' (Wade and Breedon, 1995). The consensus view was that you could control either the

price or the amount of money, but not both. In the words of an anonymous UK central banker the idea of controlling the money supply was taken up vigorously by Thatcher:

The Bank (of England) was instructed to deliver financial aggregates.... the feeling was that if you could control the money supply, and... that was really taken up vigorously by Thatcher... there were very difficult discussions between her and the Bank of England over interest rates... (if) interest rates were raised and she rang up the Bank and said "Why have interest rates gone up?" to which the deputy governor of the day is reported to have said "Well, prime Minister, it's to control the money supply". "Ah, yes, well I still don't understand why interest rates had to go up". "Well, Prime Minister, if you want to control the quantity then you have to vary the price".... "Mr Deputy Governor, I know a country where they can control the money supply without changing interest rates" and she meant Switzerland, where she'd just been on holiday.

2012 interview with UK central banker ALLADIN

According to ALADDIN, the Bank soon realised that 'the financial aggregates went all over the place... and people began to lose confidence in this as a way of managing things... a lot of it depended on the econometric matching, you know, which fitted best... irrespective of the theory behind it' (ALADDIN, 2012) and instead began to rely on interest rates to manage capital flows. To keep government debt sales moving the consensus was that the 'bank rate was generally raised (when bad news hit) in large jumps, and lowered (after good news) in small steps.... note how this practice disappears after 1990' (C. Goodhart, 2012a, p. 125). The big change was 'Big Bang' and the arrival of international banks in London, which made it a lot easier to sell public debt. 'Essentially what then happened was a divorce from the previous marriage between monetary policy and debt management' (C. Goodhart, 2012a, p. 126).

A key factor behind credit expansion has been a global reduction in interest rates for all sectors: households, governments, businesses and the increasingly deregulated financial sector. Leveraged investment is then a continuous process of re-capitalisation

and the creation of new assets with lower yields: those with assets benefit from capital gains, those without are burdened with increasing levels of personal debt and pay and increasing share of their household income towards loans and loan repayments. The financial sector takes a share of this new wealth as both fees and interest payments. As Hudson puts it 'asset price inflation is increasing the power of property over living labor and production, elevating the FIRE (Finance, Insurance and Real Estate) sector further over the real economy' (Hudson, 2010, p. 8). Hudson estimates that US housing and debt service have grown to absorb 40 per cent and 15 per cent of wage income respectively, and sees this as a drag on the real economy because the additional debt servicing costs make labour uncompetitive (Hudson, 2010, p. 9).

The period following the Volcker Shock had left interest rates high and foreign governments struggling to re-pay their US Dollar-denominated loans. It was not until 1989 that US rates began to fall, a trend that is referred to as the Greenspan put in the 'belief that under Chairman Greenspan the Federal reserve would sharply lower interest rates to prevent large stock market declines' (Palley, 2011, p. 6). Interbank rates first dipped below 0.5 per cent after the Japanese banking crisis of 1995 'when thirteen Japanese financial institutions went effectively bankrupt' (Schaede, 1996, p. 2). They fell below 0.1 per cent in 1999 and remained there until 2006, when a relatively minor increase to 0.5 per cent at the end of that year was followed by the GFC:

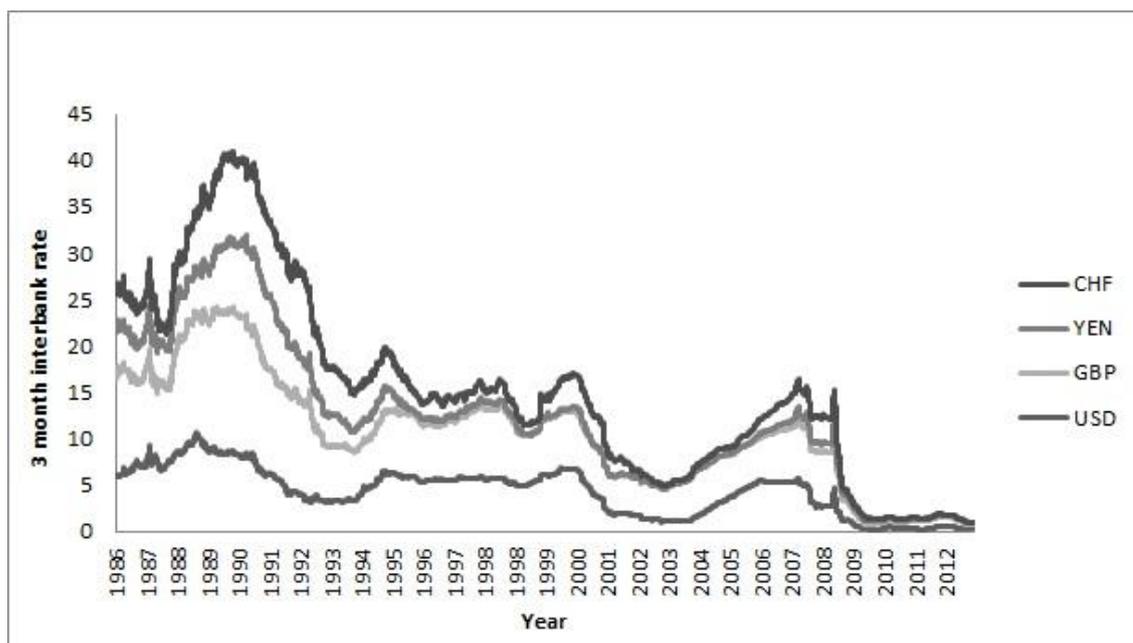


Figure 1.8: Three month interbank rates for the US, UK, Japan and Switzerland (British Bankers' Association).

This ready availability of cheap money fuelled the so-called 'Great Moderation' (Stock and Watson, 2002, p. 3) which Barwell and Burrows have split into four periods for the UK: 1994-96, 1997-200, 2001-2003 and 2004-7. Two major expansions stand out in the UK – the 'Tech Boom' from 1997-2000 and the 'Credit Boom' from 2004-7. Balance sheet growth is driven by three main activities: cross-border M&A, cross-border securitisation and intra-financial leverage.

In the 'Tech Boom', Barwell and Burrows identify M&A as a key mechanism to acquire cross-border holdings: 'if a UK company acquires a foreign company by issuing equity in the new entity to shareholders of the foreign company, both sides of the UK corporate sector's balance sheet expand; on the asset side, by the amount of foreign equity purchased and on the liability side, by the amount of the new equity issued to fund the purchase' (Barwell et al., 2011, p. 16). The net effect of cross-border M&A is that higher-yielding foreign equity assets are bought by selling lower-yielding domestic equities, which is consistent with the issuance of bonds in EAME and expansion of equity markets in APAC then the Americas (**Figures 1.5 and 1.6**). Since equities losses

are unlimited, when the bubble burst losses were primarily borne by equity holders and the banking system was unaffected.

Barwell and Burrows confirm that securitisation of households, non-financial and financial corporation liabilities led to a growing customer funding gap (a gap between customer deposits and loans): banks relied on wholesale funding in the short-term interbank markets. For households they estimate the gap was around 400 billion Sterling (Barwell et al., 2011, p. 18) but there was also an increase of around 200 billion Sterling in commercial real estate loans (Barwell et al., 2011, p. 22) and around 100 billion Sterling in private equity sponsored buyouts (Barwell et al., 2011, p. 23).

Haslam et al. point to similar processes 'during the period from the mid to late 1980s there have been significant changes to the nature of commercial and investment banking from a "retain and hold" to a "buy and sell on"¹ business model' (Haslam et al. 2012, p. 18) which is underpinned by new financialisation processes such as 'corporate restructuring, speculative asset churning, financial innovation such as asset securitisations and derivatives, and widespread adoption of mark to market accounting practices' (Haslam et al. 2012, p. 17). For the UK household sector alone, mortgage equity withdrawal has been estimated by the Bank of England to have added 2.2 per cent to post-tax income for the period 1970-2011 onwards (Haslam et al. 2012, p. 20). In other words, financialisation has a real impact on GDP.

Barwell and Burrows acknowledge that household and business sector lending account for only half of the expansion in the UK banking sector's balance sheet between 2000 and 2007: the remainder is due to intra-financial leverage on foreign assets and intra-sector claims between the banking and non-bank financial sectors: they estimate that intra-financial sector claims 'grew around 166% between 2000-7, compared to growth in claims on the domestic real economy of around 80%' (Barwell et al., 2011, p. 26). This is troubling, because it suggests that only half the story is being told, and there was also a bailout of banks' balance sheets.

The Bank of England publish balance sheets for the Monetary Financial Institutions (MFIs) - banks or building society over a certain size that have access to overnight

¹ 'originate and distribute'

lending from the Bank should they experience liquidity problems. However, the public data are only available for the last two years. The snapshot shown in **Figure 1.9** shows that there was, indeed, a carry trade on the aggregate banks' balance sheets from June 2010 until August 2011: in aggregate, the UK MFIs were selling Sterling and buying foreign currency. The unwinding of this carry trade coincided with the announcement of 50 billion Sterling of asset purchases under Quantitative Easing (QE).

In normal times, leveraged cross-border investment can be profitable, something which is described as the 'venture capitalist nature of US cross-border positions... with liabilities primarily in debt-like instruments that generate only modest capital gains and assets having a greater weight on equities' (Curcuru et al. 2008, p. 17-18). For the US, these authors estimate that by selling low-yielding assets and investing in high-yielding assets, they can account for about half of the paradox that the US is able to run a persistent trade deficit with the rest of the world: the US economy earns about 0.9-1.1 per cent more on foreign investments than it pays on foreign loans. Like the US, the UK shares an unprecedented 'ability to generate net investment income from an apparent net debtor position' (Whitaker, 2006, p. 291).

If this is the case, there are two issues. First, when there are profits to be made, the losses are being made in trading partners of the UK and US, which include emerging and developing economies. By one estimate the lower yield on US Treasury bills in emerging economy reserves represents a loss estimated to be 1.3 per cent of their GDP in 2009 (International Monetary Fund, 2010, p. 9). Second, if the central bank supports the banking sector during crises, then the central bank is not independent or neutral in its support. These questions as to who are the winners and losers in currency markets are investigated empirically in **Chapter Six**.

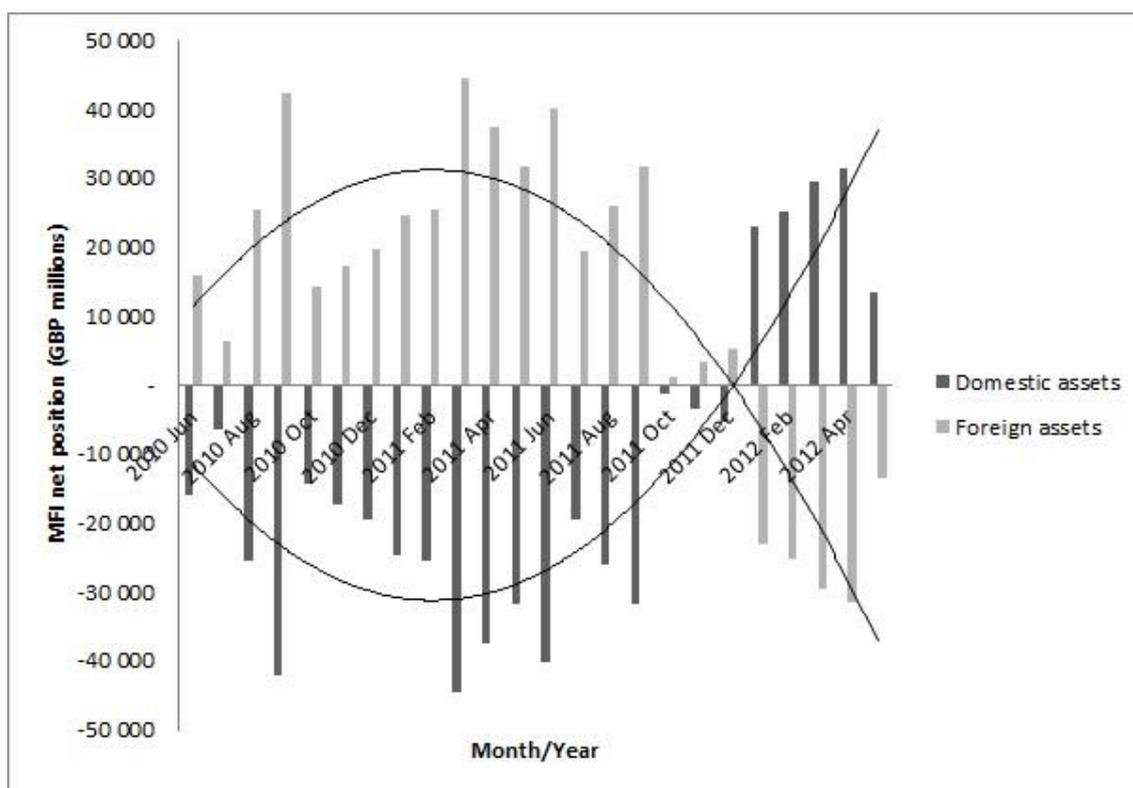


Figure 1.9. Net Sterling position and net foreign currency position for all UK MFIs excluding the central bank (Bank of England BankStats B1.4).

Lenders of last resort

It is certainly the case that the Federal Reserve and Bank of England went into overdrive to support private financial institutions during the GFC. The Fed lent to a wider category of counterparties, accepting more collateral and expanding its balance sheet by two trillion US dollars in 2009-10 (Hudson, 2010, p. 8). The same was happening in the UK: by February 2010 the Bank of England had issued 200 billion Sterling of new reserves, an amount equivalent to 14 per cent of GDP, driving down borrowing costs by an estimated 100 basis points (Joyce et al. 2010, p. 3). While the UK has seen a rise in public sector debt to around 70 per cent of GDP, if you include 'financial interventions' since 2007-8 this doubles to over 140 per cent (Office for National Statistics, 2012, p. 25).

Critics argue that much of this new liquidity went straight out of the US and UK into higher-yielding, foreign assets as carry trade speculation:

The irony is that money that was intended to rekindle the American economy is causing havoc all over the world. Those elsewhere in the world say, what the United States is trying to do is the twenty-first century version of “beggar thy neighbor” policies that were part of the Great Depression: you strengthen yourself by hurting others.

(Stiglitz, 2010)

Hudson makes a similar point:

What makes these speculative capital inflows so unwelcome abroad is that they do not contribute to tangible capital formation or employment. Their effect is simply to push up foreign currencies against the dollar, threatening to push exporters out of global markets, disrupting domestic employment as well as trade patterns. These financial gambles are setting today’s exchange rates, not basic production costs.

(Hudson, 2010, p. 12)

And practitioners confirm that new strategies are profitable:

Given what’s happened to interest rates since 2007 the standard model of Dollar/Yen carry currencies and Sterling/Euro as your breadwinners just isn’t there anymore. To be honest... since 2007 (developed countries) performed very, uh, pretty poorly because your carry currencies like Sterling don’t offer you any carry. But once you go to the G10 realm, there are one or two countries out there that still have reasonable interest rates, most notably Australia.

2012 interview with UK FX manager SPACEMAN

There is also a growing literature that suggests QE has a distributional effect, by propping up asset prices and impacting wealth distribution (Bank of England, 2012a; Joyce et al., 2010). The literature says very little about the impact on the exchange rate. One paper from the Bank of England states that ‘the exchange rate depreciated substantially prior to QE, it was relatively stable during the QE period and has remained broadly flat since’ (Bridges and Thomas, 2012, p. 6). The Bridges and Thomas analysis acknowledged that asset prices were boosted by QE, but their model assumes ‘the long-run neutrality of money. As a result, the long-run impact on the real exchange rate is zero’ (Bridges and Thomas, 2012, p. 25).

Similar asset purchase programmes were announced by the Swiss National Bank, European Central Bank and the Bank of Japan. The Bank of Japan said it will ‘pursue *aggressive* monetary easing, aiming to achieve the “price stability target” through a *virtually zero interest rate policy* and purchases of financial assets... including government bonds, corporate bonds, CP (commercial paper), Exchange-Traded Funds (ETFs), and Real Estate Investment Trusts (REITS), from the market through a program called “Asset Purchase Program”’ (Yamaguchi, 2013, p. 8-9, *own italics*). Underpinning this behaviour is the idea that central banks act as lenders of last resort. The Bagehot principle is that ‘the only safe plan for the Bank (of England) is the brave plan, to lend in a panic on every kind of current security, or every sort on which money is ordinarily and usually lent. This policy may not save the Bank; but if it did not, nothing will save it’ (Bagehot 1873, p. 189). However, liquidity and solvency are not inseparable, in which case the role of government is surely to ensure the payments system remains functional and that credit is extended to viable businesses in the non-financial sector: ‘illiquidity implies at least a *suspicion* of insolvency’ (Goodhart 1999, p. 345).

The primary mechanism by which central banks support liquidity is to lend overnight against good collateral: by lowering interest rates they hope to expand supply and vice-versa. Private banks with access to this overnight lending facility will establish network links with the central bank and these networks extend to others via the committees of the central bank. For example, the Bank of England operates the

Foreign Exchange Joint Standing Committee (FXJSC) which 'was established in 1973, under the auspices of the Bank of England, as a forum for banks and brokers to discuss broad market issues' (Bank of England, 2012, p. 160).

Since FXJSC membership is largely comprised of bankers, brokers, traders and regulators there are real possibilities for collusion. Becoming an 'eligible institution' in more than one country creates the conditions to arbitrage between central banks by taking bets on the direction of interest rate movements: whether the interest rate in Russia will rise compared to the Federal Reserve; or the Federal Reserve rate will rise compared to the Euro; and so on. Making speculative bets on these movements requires inside knowledge on difference in the practices and beliefs of central bankers.

There is an established literature on the mechanisms by which powerful groups gain market advantages through 'regulatory capture' and this literature provides a useful framework to analyse the extent to which central banks might have been captured.

The core theory was outlined by Stigler in 'A Theory of Economic Regulation' (Stigler, 1971) and, rather poetically, is the application of the economics of supply and demand. Regulation is considered to be a market where the demand (better regulation) is greater than the supply. Stigler assumes that supply is limited not because of a lack of new ideas, but because political decisions are expensive to bring about because of the costs of influencing a large number of people and their elected representatives. In other words, democracy imposes a cost burden that this powerful group are more likely to overcome because they are better able to organise themselves in pursuit of profit. Stigler used the example of the US railroad industry, whose intense lobbying successfully restricted competition from the trucking industry. The theory was extended by Peltzman to include demand-side power to consumers and via pressure groups (Peltzman, 1976). In other words, whether the producer or consumer succeeds in 'regulatory capture' depends which outcome is best for politicians in terms of a share of producer profits and their need to hold on to political power.

Stigler suggests four characteristics of 'regulatory capture':

- i) the existence of direct subsidies;

- ii) barriers to market entry;
- iii) price fixing; and
- iv) undue influence over substitutes and complementary products

To which we might add:

- v) Revolving doors between the regulator and industry. These make it difficult to provide incentives to recruit financial regulators if the private sector is offering higher wages (Laffont and Tirole, 1991); and
- vi) 'Regulatory capture by sophistication' (Hellwig, 2010, p. 5) where the complexity of regulation, including the complex mathematics and practices of risk management and pricing, exclude others from the regulatory process

Are these six characteristics a feature of banking? Direct subsidies are suggested by expansionary monetary policy when central banks are lowering interest rates to stimulate investment. More generally, creditor-friendly policies under the 'Washington Consensus' support private financial interests. 'In standard market economics, if a lender makes a bad loan, he bears the consequence.... this is the way market economies are supposed to work. Instead, repeatedly, the IMF programs provide funds for governments to bail out Western creditors' (Stiglitz, 2002, p. 201).

There are very high barriers to market entry in the banking sector, including the barriers created by location (foreign exchange trading being concentrated in expensive cities like London and New York). To illustrate these barriers, consider these snapshots of the criteria to become eligible as an MFI. The main eligibility criteria are to comply with national rules on capitalisation and to have deposits above a certain size. The European Central Bank defines eligibility criteria in the 2009 Banking Co-ordination Directive (European Central Bank, 2013a); the Federal Reserve defines them in the Federal Deposit Insurance Act, Section 3 (Federal Deposit Insurance Corporation, 1950); and the Bank of England in the 1998 Bank of England Act; and there are similar regulations in Russia (Bank of Russia, 2009).

Common to each of these is that banks need to be capitalised above a certain size: for the Bank of England, reported average eligible liabilities need to be over £500 million

and the Russian Central Bank requires that an eligible institution satisfies ‘reserve requirements, should have no overdue money liabilities to the Bank of Russia, including debt on Bank of Russia loans and interest on them’ (Bank of Russia, 2009). In the US, eligibility for special facilities was extended at the height of the crisis (between March 2008 and 1st February 2010) to a whole new class of primary credit dealers (Federal Reserve Bank of New York, 2008), which underlines the power that dealers have within the banking system.

A second barrier to entry is that MFIs must provide sufficient collateral. Typically, this collateral is domestic debt in the form of government bonds. This requirement reflects the central bank’s traditional role as the government’s banker, but this traditional role is increasingly being undermined. The Swiss National Bank extends eligibility to include foreign-denominated bonds, including those issued by the failed Royal Bank of Scotland (Swiss National Bank, 2013a); the Bank of Japan has extended eligibility to include equities as ETFs that ‘track the Tokyo Stock Price Index (TOPIX) or the Nikkei 225 Stock Average’ and property as Japanese REITS (Bank of Japan, 2013, Attachment 2).

Price fixing has recently come under regulatory scrutiny, with hefty fines from the European Commission for breaking antitrust laws and participating in cartels to rig interbank rates (Kregel, 2012; Touryalai, 2013) and the UK Financial Services Authority and other international regulators ‘have taken regulatory action in relation to attempted manipulation of LIBOR (London Interbank Offered Rate)’ (Wheatley 2012, p.11). The European Commission has also started antitrust enquiries into the rigging of foreign exchange markets, with foreign exchange traders suspended at global banks in London, New York and Tokyo (BBC, 2014a; Schäfer et al., 2013; Vaughan et al., 2013). Mark Carney, Governor at the Bank of England, in his oral evidence to the Treasury Committee said ‘this is extremely serious.... as serious as LIBOR if not more so— time will tell—because *this goes to the heart of integrity of markets and we have to establish the integrity of markets*’ (Treasury Committee 2014, p. 20, *own italics*).

How does price-fixing work? A good guide here is the Treynor model for the ‘economics of the dealer function’. According to this model, dealers limit the position

they are willing to take and, when they reach that limit they will 'lay off to the only other transactor in the market... the market-maker of last resort' (Treynor 1987, p. 27-28). In other words, dealers make small profits by selling (a short position) when the price is high and buying (a long position) when the price is low.

QE, of course, introduces a new market-maker of last resort: the central bank. If traders know that the central bank will buy bonds at a particular time of the day, this offers the possibility of collusion between bond and currency traders. The trick is simply to have a short position when the central bank is buying and unwind that short position when the central bank is inactive and there are other buyers in the market. **Figure 1.10** shows how this works. When the central bank is market-making the dealer goes short, and when the central bank is inactive the dealer goes long:

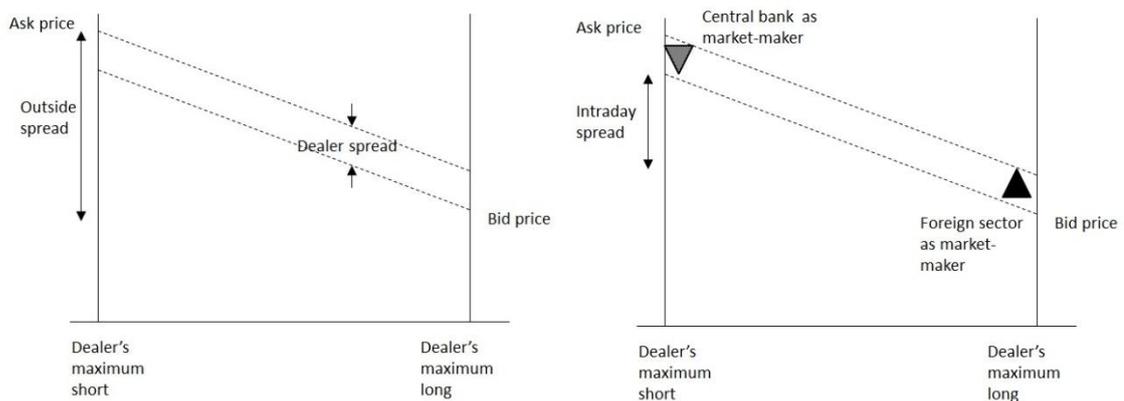


Figure 1.10. *The Treynor dealing model (left image); foreign exchange dealer behaviour when the central bank is acting as market-maker (right image, left-hand side); and foreign exchange dealer behaviour when the foreign sector is acting as market-maker (right image, right-hand side).*

What do the data show? Intraday foreign exchange prices suggest there were noticeable price effects in foreign currency markets during various QE programmes. **Figure 1.11** shows that the Yen, UD Dollar and Sterling were higher when the domestic market was open. Unless central banks run a twenty-four hour trading desk, it is reasonable to assume that central bank purchases took place during domestic market hours, which suggests that a foreign dealer of US, UK or Japanese government bonds could make a significant loss on foreign exchange. Meanwhile, a trader who timed

their foreign exchange trades perfectly would have made gains of 6 per cent, 5 per cent and 16 per cent in the UK, US and Japan respectively. All three currencies are weaker overnight, but there is no smoking gun here: foreign traders lost the most outside London trading times, but the results are less clear cut for traders in Tokyo and New York. The opportunity for profit exists, but evidence of collusion is another matter:

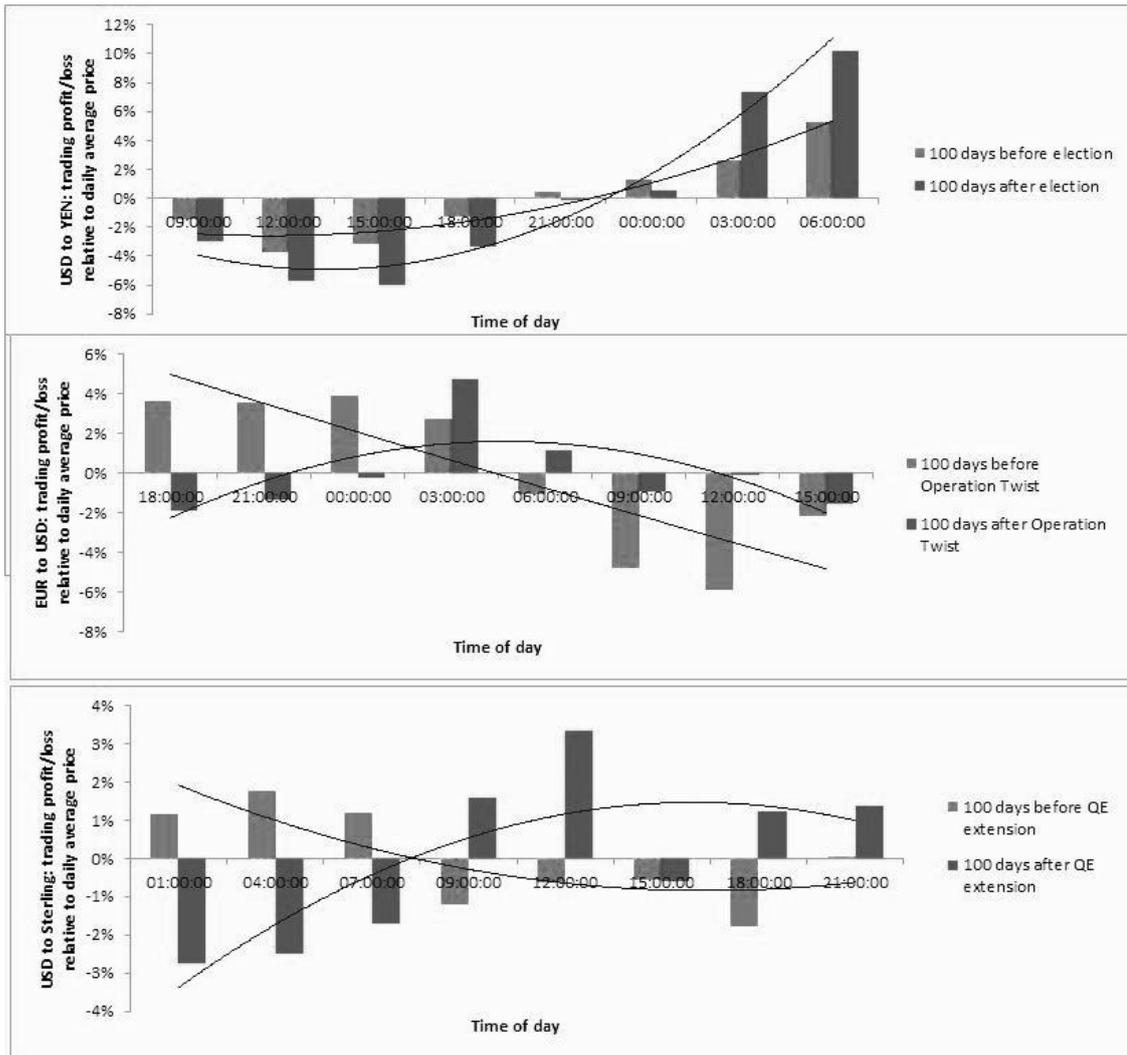


Figure 1.11. Total potential profit from intra-day trading strategy over 100 days. Each bar is the total difference over 100 days from trading at the reported time, compared to trading at the daily average price (arithmetic mean). The three currency pairs are US Dollars to Sterling; Euros to US Dollars; and US Dollars to Yen. The three event dates are 6th October 2011 (QE extension in the UK); 21st September 2011 (Operation Twist in the US); and 26th December 2012 (election of Shinzō Abe in Japan).

For an example of the fifth bullet point, there is no shortage of examples of complementary products and alternative currencies that have been rejected or resisted, such as Keynes' bancor proposal that was rejected at Bretton Woods. This plan was designed to avoid one or more currencies dominating international liquidity – instead 'foreign exchange reserves were to be concentrated in national central banks with purchases and sales of currencies among central banks only through accounts with the ICU (International Clearing Union) that were to be denominated in bancor' (D'Arista 2009, p. 639). Since interest would be charged on both credits and debits, the burden of adjustment and settlement costs would fall on both. Liquidity would be shared internationally, with the size of International Clearing Union overdrafts based on trade. A similar starting point, using a GDP-weighted currency basket, is proposed as a benchmark for currency portfolio management (Grinold and Kahn, 2000 p. 527).

Other examples include an Asian Monetary Unit; an African Monetary Unit; the European Currency Unit that was replaced by the Euro in 1999; and Special Drawing Rights (SDRs) (Fanning, Goldberg, and Northway, 2010 p. 44). SDRs were created by the IMF in 1969, and gave deficit countries 'an unconditional right to obtain foreign exchange or other reserve assets from other IMF members' (IMF 2010, p. 20) but their take up has been limited to 'about four per cent of total reserves' (IMF 2010, p. 22).

New currencies include the bitcoin, which uses encryption to ensure that transactions are beyond the reach of government, but recording them in a public ledger (proof-of-work) 'to prevent double spending' (Nakamoto, 2009, p. 8); local currencies like the Bristol Pound (Bristol Credit Union, 2013); and other peer-to-peer, decentralised systems with no central issuer but rather 'a framework agreement providing a mutual guarantee of credit obligations created and issued by producers and accepted directly – 'Peer to Peer' – by consumers' (Cook, 2012). In some cases these currencies are 100 per cent backed by fiat money and linked closely to barter exchange, or their liquidity is created in a way that is 'designed to enrich early adopters' (Cohen, 2011) rather than providing public benefits or solving issues with international trade.

The last two issues, of revolving doors and 'regulatory capture by sophistication', were illustrated earlier by the FXJSC in the UK, which is a committee largely comprised of

practitioners in banking, finance and economics. The trend in central banking has been towards independence, such as that granted to the Bank of England in 1997, which has moved central banks away from democratic control.

Many commentators call for this trend to be reversed. Palley argues that central banks have suffered from 'political capture, cognitive capture and intellectual hubris' (Palley, 2011, p. 1) and calls for a reform of governance so that they become intellectually more open-minded; he proposes that the Fed is 100 per cent publically owned, with the Chairman appointed by the President and the publication of an annual report that addresses the measures taken to avoid regulatory capture. Goodhart calls for a return to the traditional banking of Bagehot's day where the central bank is 'much more closely involved with fiscal policies than in the past' (C. Goodhart, 2012a, p. 129). The compelling event, Goodhart argues, is that the sustainability of government debt has been threatened by bank bailouts: 'when the debt ratio, and fiscal deficits, rise to the point that bring questions of sustainability into the offing, the level of the official short-term interest rate inevitably becomes a matter of great fiscal consequence to the Minister of Finance. Monetary policy, fiscal policy and debt management then become joined at the hip' (C. Goodhart, 2012a, p. 129). This public purpose role is echoed by Goodfriend: 'the relationship between the central bank and the Treasury must be more intimate' (Goodfriend, 2000, p. 1030). A third commentator, Epstein, suggests 'integrating the central banks into government and reduces the scope and power of speculative markets... central bank independence and speculative markets are likely to be a deadly combination' (Epstein, 1992, p. 22).

Prescriptions for integrated fiscal-monetary include direct support from the central bank for government via credit creation. These include support for employment and jobs, something that Minsky wrote about as 'a government employment policy strategy... the employment programs are to be permanent, operating at a base level during good times and expanding during recession' (Minsky 1986, p. 343). This idea is taken up enthusiastically by proponents of Modern Money Theory which stresses that government can directly produce liquidity as high-powered money: 'the State must spend or lend its (high-powered money) into existence before banks, firms, or households can get hold of coins, paper notes, or bank reserves' (Fullwiler, Kelton, and

Wray, 2003, p. 3). Fiscal-monetary policies go to the heart of debate about whether the central bank exists to support the private or public sector, and can be seen in Hawtrey's 'Theory of Banking' when he wrote that 'the power of issuing paper money always exists in the background, even if it be expressly forbidden by law. The State cannot divest itself of this power or of the responsibility attached to it' (Hawtrey, 1919, p. 201). According to respondent ALADDIN, the culture at the Bank of England was embedded in 'a *very, very traditional role*' (as Banker to the government) that persisted until central bank independence.

Lord Turner suggests that 'in the deflationary, deleveraging downswing of the economic cycle, we may need to be a little bit more relaxed about the creation, within disciplined limits, of additional irredeemable fiat base money' (Turner, 2013, p. 42). These domestic policies extend to housing and green investment 'in real economy activities, such as the BBB (British Business Bank), the GIB (Green Investment Bank), and housing construction by housing associations and local authorities' (New Economics Foundation, 2013, p. 55). In the US, calls for a \$1 trillion platinum coin to fund general government spending were backed by Krugman (Krugman, 2013).

Critics of these calls for fiscal-monetary policies argue that they fail to grasp the domestic institutional complexities by assuming that 'the fiscal authority and central bank act as if they were a consolidated single actor' (Palley, 2013, p. 6). These debates are worthy of another chapter in themselves, in particular their impact on developing and emerging economies that hold US Dollar and Sterling-denominated financial assets.

There is evidence for regulatory capture at the international level, too. A vocal critic of the Bretton Woods institutions is Stiglitz, who bases his criticism on personal experience working at the World Bank. By custom or tacit agreement, the head of the IMF is always a European, and that of the World Bank an American. Then, problems 'arise from who speaks for the country. At the IMF, it is the finance ministers and the central bank governors. At the WTO (World Trade Organisation), it is the trade ministers' (Stiglitz, 2002, p. 19). Alternatives to the Bretton Woods institutions are discussed in more detail in **Chapter Two**.

Summary

The evidence on regulatory capture illustrates the difficulties that face any programme to reform liquidity provision: politics and power. For international reforms to gain momentum there is the added difficulty of co-ordinating national interests. Imbalances between creditors and debtors make this an unlikely scenario, and a series of bilateral arrangements (similar to those that led to the adoption of the Gold Standard between 1870 and 1914) would seem more plausible. To date, the evidence is that QE in the UK and US has supported the financial sector by underpinning asset prices and deferring solvency issues.

Meanwhile, there is an ongoing risk that developed economies will continue to see private debt as a temporary panacea: a sort of 'privatised Keynesianism' (Crouch, 2009 p. 397). World equity market capitalisations, as a percentage of World GDP, are not far from their level in 1999; in most developed economies, private debt levels are continuing to rise; and the only silver lining in terms of reducing leverage is that World bond issuances appears to be lower (especially in the Americas). Tax avoidance leaves countries like Luxembourg, Ireland, the UK and the Netherlands looking particularly leveraged and is a thorn in the side of governments struggling to boost their domestic economies after the GFC. At the same time, the evidence from commentators is that cheap funding as a response to the GFC has stimulated carry trades with emerging and developing economies.

Finally, the concentration of asset management in key financial centres, notably London, creates other headaches for regulators: these include a concentration of risks from financial fragility and greater opportunity for collusion. In the middle of all of this activity are the four major banks that intermediate over half of foreign currency trades, using pricing models that assume a no arbitrage condition, despite the evidence that large profits are being made from assuming the opposite. The problem looks familiar: 'Too much money in too few places' (Weller, 1983).

CHAPTER 2: Policy Perspectives

Introduction

This Chapter outlines the policy consensus that emerged after the collapse of Bretton Woods, and some of the alternatives. Fiscal policy plays a key role in nurturing growing industries and supporting long-term growth; and capital flow management is used to minimise the disruptive impact of speculative capital flows. Since the GFC the IMF have softened their stance towards capital controls, but their revised position is conditional and asymmetric. The risks posed by excess liquidity in the US-UK-European financial core are rarely discussed.

In more normal times, the IMF prefers macroprudential policy measures aimed largely at the banking sector. The US has brought in the Volcker rule to limit speculation, and the UK has opted for ring-fencing of retail and investment banks (but not until 2019). However, there has been little discussion about the foreign exchange risks posed by non-banks: asset managers and non-bank financial firms, businesses and households.

The Keynes plan, first circulated in 1943, aimed to tackle these risks by clearing all foreign currency transactions through the central bank. The plan was designed to eliminate bilateral clearing, minimise foreign exchange risks, discourage speculative capital flows and penalise creditors and debtors equally to encourage equilibrium. However, member States would relinquish international liquidity to a supranational Governing Body. Instead, the Bretton Woods agreement relied on the convertibility of US Dollars to gold and US trade surpluses, as discussed in **Chapter One**.

More recent proposals are then discussed: centralised, public clearing systems; the development of a fiat, world currency (like the Euro); taxes to dissuade speculation; and taxes to penalise creditors and debtors.

Finally, alternative and debtor-friendly policies are discussed including debt forgiveness, and changes to bankruptcy law to place speculative contracts (in derivatives markets) below bonds and equities. QE and fiscal-monetary policy are among these 'forbidden fruits'.

Washington Consensus

The post-Bretton Woods policies emanated from ‘the political Washington of Congress and senior members of the administration and the technocratic Washington of the international financial institutions, the economic agencies of the US government, the Federal Reserve Board, and the think tanks’ (Williamson, 1990, p. 1) are referred to as the Washington Consensus (Camara Neto and Vernengo, 2005 p. 334; Chang and Grabel, 2005 p. 275; D’Arista, 2008 p. 523; Davidson, 2005 p. 208; Kregel, 2008 p. 546; Ocampo, 2004).

This consensus view was predicated on three pillars: fiscal austerity, privatisation and market liberalisation. A mixture, or all, of these policies were often pre-conditions before a country received support from the IMF or World Bank:

1. Fiscal discipline, where the government runs a balanced budget over the economic cycle and tax cuts to promote private sector growth;
2. Public expenditure priorities that remove subsidies and target basic education and healthcare;
3. Tax reform, so that the government can achieve a balanced budget;
4. Interest rate liberalisation;
5. A competitive exchange rate that helps a country reach a trade balance – generally a weak currency to promote exports and drive down trade deficits;
6. Trade liberalisation, without protectionism;
7. Liberalisation of Foreign Direct Investment;
8. Privatisation, to relieve pressure on government budgets;
9. Deregulation to encourage competition; and
10. Secure property rights.

(Williamson, 1990) cited in (Davidson, 2005 p. 208).

As discussed in **Chapter One**, critics argue that these policies 'bail out Western creditors' (Stiglitz, 2002, p. 201): based on secure property rights, lenders would get their money back by improving the profitability of the borrower. A competitive exchange rate would lower the relative cost of labour, lower taxes would increase corporate profits, and privatisation would provide government windfalls to fund deficits. Trade liberalisation and FDI worked because either foreign firms could dominate a weak domestic market by passing through their exchange rate costs as inflation (Lavoie, 2009, p. 50) or, with interest rate liberalisation and inflation targeting, FDI inflows would drive inflation and yields, attracting further FDI as 'destabilising speculation' (Plantin and Shin 2011, p.15). These speculative dynamics are discussed more fully in **Chapter Three**.

The development alternative

The idea that there were no alternatives to the Washington Consensus was criticised by development economists as being a 'fundamentally and dangerously incorrect (perspective)' (Chang and Grabel, 2005, p. 274). These academics illustrate the myth that developed countries practised what they preached using various historical examples: Edward III banned the import of woollen cloth; Henry VII banned the export of unfinished cloth; Walpole lowered import duties on raw materials and gave duty drawbacks to exporters; Irish wool and Indian cotton imports were banned; and so on. Chang and Grabel argue for capital flow management rather than financial openness: not rushing to stock market development in emerging economies; limiting foreign loans; ensuring FDI is linked to industrial policy; and directing public investment towards growth by investing in health, education, transport and communications. These alternatives are wary of financial liberalisation and suggest government should evaluate policies on their contribution to long-term growth.

The rationale for capital flow management is that it prevents sudden flows of 'hot money' that create asset price bubbles, leading to more speculative inflows until the bubble burst: the financial crises discussed in **Chapter One**. Results from a wide range of papers 'suggests that capital controls were successful in altering the composition of capital flows towards longer maturities and in making monetary policy more independent' (Magud and Reinhart, 2007 p. 650).

Since the GFC, the IMF have softened their stance towards emergency controls on capital, acknowledging 'a role for certain measures, such as capital controls, to dampen excessive movement when necessary' (International Monetary Fund 2010, p. 15). In Latvia, the IMF agreed a partial deposit freeze from December 2008 to December 2011; in Iceland, 'technical assistance on capital controls was requested from the IMF in November 2008 and controls were subsequently implemented on November 28, 2008' (Grønn and Fredholm, 2013, p. 29); and on March 27th capital controls came into force in Cyprus (Freshfields Bruckhaus Deringer, 2013, p. 2).

However, this relaxed stance did not apply elsewhere. In Eastern Europe the IMF policy was for borrowing countries 'to implement contraction in effective demand through overvalued exchange rates, fiscal tightening and wages cuts' (Gabor, 2010, p. 824). The alternative, interest rates cuts, would 'trigger capital outflows and depreciations that might worsen banks "Euroized balance sheets"' (Gabor, 2010, p. 824). Currency markets in Russia and Eastern Europe were dominated by short-term positions from 2007-10 (over 90 per cent had a maturity less than seven days); and that over half of Eastern Europe housing and consumption loans were in foreign currency (Gabor, 2011). Again, IMF support came on the condition that creditor-friendly policies were implemented.

The new IMF view is also asymmetric because the burden falls on the recipient to manage capital inflows (Ostry et al. 2010, p. 5). The first stage in capital flow management is to self-insure by running a trade surplus and accumulating foreign reserves; these reserves are estimated to have cost emerging economies about 1.3 per cent of their GDP in 2009 (International Monetary Fund, 2010, p. 9; **Chapter One**). The second stage is to adjust via interest and exchange rates, with monetary and fiscal tightening. Although the IMF have published Spillover Reports for developed economies, these do not discuss instability created by an excess of international liquidity. Instead, there are risks from 'trapped pools of liquidity' (International Monetary Fund, 2011, p. 2) that require 'stronger and more co-ordinated regulation in the (US-UK-European financial) core... (where) the UK needs to be vigilant to not become a magnet for risks regulated out of other jurisdictions' (International Monetary Fund, 2011, p. 2).

That the risks from excess liquidity in the core are rarely recognised by the Bretton Woods institutions has been criticised by the Independent Evaluation Office. They found that many officials felt ‘the IMF should have placed greater emphasis on other developments... in particular the causes and consequences of fluctuations of global liquidity and international capital flows – that they considered to be of more pressing concern than reserves’ (Independent Evaluation Office, 2012, p. 1).

A rare exception was a 2009 United Nations commission, chaired by Joseph Stiglitz, which blamed the GFC on ‘loose monetary policy, inadequate regulation and lax supervision’ (United Nations, 2009, p. 3). The commission called for developing countries to ‘use all the tools at their disposal, price interventions, quantitative restrictions, and prudential regulations, in order to help manage international capital flows. ‘The Fund should thus be encouraged to return to its first principles and support countries that attempt to manage external flows in support of domestic counter-cyclical policy’ (United Nations, 2009, p. 17). Finally, the commission called for international fiscal policies supported by taxes, such as a carbon tax or financial services tax. Yet spillover risks are downplayed by developed countries. Ben Bernanke (former Chairman of the Federal Reserve Board of New York) said that ‘the linkage between advanced-economy monetary policies and international capital flows is looser than is sometimes asserted’ (Bernanke 2012, p. 4).

Macroprudential policies

In more normal times, the IMF prefers macroprudential policy measures which are ‘prudential tools primarily designed to maintain financial system stability’ (Grønn and Fredholm, 2013, p. 13). The assumption is that the national regulators will devise an appropriate set of policies for their domestic economy: the separation of retail and investment banking, narrow or ‘full reserve’ banking², appropriate capital adequacy

² The ‘Chicago Plan Revisited’ (Benes and Kumhof, 2012) was based on a proposal, at the height of the Great Depression, to separate monetary and credit functions. Deposits would be 100 per cent backed by government-issued money; domestic lending would be via investment funds (with equity-like properties); and investment lending would be backed by treasury credit. The proposal would involve ‘a very large buy-back of private debt’ (Benes & Kumhof, 2012, p. 6).

ratios, prudent collateral arrangements, centralised clearing, regulatory reporting of financial risks, and so on. Since most of these policies are national, the regulatory costs lie with those on the receiving end of speculative capital flows. Since the GFC, the US has brought in rules to reduce speculation under the Volcker Rule which 'prohibits banking entities within a universal bank from engaging in proprietary trading' (H.M.Treasury, 2012, p. 68). In contrast, the UK has rejected the Volcker Rule and narrow banking proposals and opted for ring-fencing which 'prohibits banks that accept retail deposits from undertaking a range of activities that are not directly connected to providing payment services and making loans' (H.M.Treasury, 2012, p. 10). These UK reforms are not due until 2019. Added to this are proposal to claw back bankers' bonuses for up to seven years (BBC, 2014b) and a revised Basel III accord that 'proposes international harmonisation of the definition of capital and the introduction of a leverage ratio, as well as tighter standards for bank liquidity, and various measures to reduce the procyclical effects of capital regulation' (Hellwig, 2010, p. 2).

However, even if foreign exchange risk were completely eliminated from the banking sector, with countercyclical capital buffers, no foreign exchange mismatches on banks' balance sheets or in their trading positions, there are foreign exchange positions on the balance sheets of asset managers, businesses, non-bank financial firms and households. As **Chapter One** discussed, offshore US Dollar liquidity was building up in Eurodollar banks before the collapse of Bretton Woods, and lending, debt and equity markets have increasingly decoupled from World GDP. What are the policy proposals for foreign exchange risk in these sectors and markets?

An International Clearing Union

The Keynes plan was first circulated within the British Treasury, later issued as a White Paper in April 1943. The principle of the plan was to prevent blocked balances and bilateral clearing arrangements for foreign currency. This would be achieved by using national currencies for domestic transactions and clearing all foreign currency transaction through the central bank:

The proposal is to establish a Currency Union, here designated an International Clearing Union, based on international bank-money, called (let us say) bancor, fixed (but not unalterably) in terms of gold and accepted at the equivalent of gold by the British Commonwealth and the United States and all the other members of the Union for the purpose of settling international balances. The central banks of all member States (and also of non-members) would keep accounts with the International Clearing Union through which they would be entitled to settle their exchange balances with one another at their par value as defined in terms of bancor. Countries having a favourable balance of payments with the rest of the world as a whole would find themselves in possession of a credit balance with the Clearing Union, and those having an unfavourable balance would have a debit account. Measures would be necessary (see below) to prevent the piling up of credit and debit balances without limit, and the system would have failed in the long run if it did not possess sufficient capacity for self-equilibrium to secure this.

(Horsefield, 1969, p. 21)

The value of national currencies to bancor, and of bancor to gold, would be fixed by the Governing Body but adjustable, with quotas based on imports and exports. In other words, the capital and financial account are completely closed. Both debit and credit balances would carry interest penalties if these quotas were exceeded, and the Governing Body would be able to adjust global liquidity conditions by altering these interest penalties.

The five key elements of the plan were therefore to i) eliminate bilateral clearing ii) relinquish management of international liquidity to an International Governing Body iii) to discourage speculative capital flows iv) to minimise cross-border foreign exchange risks and v) to penalise creditors and debtors equally to encourage equilibrium.

The benefits of a centralised, public clearing system are emphasised by current reform proposals. D'Arista argues for reforms 'to promote stability and balance by rebuilding a

channel for balance-of-payments settlements managed by authorities that represent public rather than private interests' (D'Arista, 2008, p. 523). Davidson argues for a 'closed, double-entry bookkeeping, clearing union institution to keep the payments score among the various trading regions, plus some mutually agreed-upon rules to create and reflux liquidity while maintaining the international purchasing power of the international currency' (Davidson, 2005 p. 219). The strength of a centralised, public clearing system is that there is daily netting and settlement between all currencies, which reduces the opportunities for speculation. For this reason, a clearing union proposal would be strongly opposed by the private sector, but this is exactly why a payments system is needed.

Since the GFC, prominent people have pushed for reforms to international liquidity provision, similar to the *bancor*. Zhou Xiaochuan, Governor of the People's Bank of China, wrote that 'the crisis again calls for creative reform of the existing international monetary system towards an international reserve currency with a stable value, rule-based issuance and manageable supply' (Xiaochuan, 2009, p. 1). One IMF discussion paper suggests that 'an ambitious reform option would be to build on the previous ideas and develop, over time, a global currency. Called, for example, *bancor* in honor of Keynes, such a currency could be used as a medium of exchange—an outside money in contrast to the SDR which remains an inside money' (International Monetary Fund, 2010, p. 27). This would be adopted as a fiat, common currency (like the Euro) or as a parallel currency. This IMF discussion posed a number of questions and suggestions, including approving the 4th Amendment to the Articles of Agreement (so that Fund members who joined after 1981 also benefit from SDRs); a GDP-weighting of the SDR basket, the development of SDR-denominated securities; and the backing of a reserve pool entrusted by member countries from their national reserves.

Since the GFC, there has been some progress on the taxation of speculative capital flows. Keynes had suggested that 'the introduction of a substantial Government transfer tax on all transactions might prove the most serviceable reform available, with a view to mitigating the predominance of speculation over enterprise' (Keynes, 1936, p. 160). The idea was taken up by Tobin, who was concerned that, under the system of floating exchange rates, 'speculation on future prices is the dominating preoccupation

of the participants (in foreign exchange markets)' (Tobin, 1978 p. 157). Hence Tobin's well-known proposal to 'throw some sand in the well-greased wheels... (with an) internationally agreed uniform tax, administered by each government over its own jurisdiction' (Tobin, 1978 p. 158). The debate has certainly change since the GFC and 'at the very least we should take Financial Transaction Taxes out of the "index of forbidden thoughts"' (Turner, 2010 p.29)³.

The Europe Commission is implementing a Financial Transaction Tax (FTT) among core countries (including Germany, France and Spain): the tax is for 0.1 per cent tax on bonds and equity transactions, 0.01 per cent on derivatives, and with foreign exchange spot transactions exempt. The objective is for 'the financial industry (to make) a fair contribution to tax revenues, whilst also creating a disincentive for transactions that do not enhance the efficiency of financial markets' (Council of the European Union, 2013). The UK, unsurprisingly perhaps, is resisting: the FTT was 'mainly the reason given for the Cameron veto in Brussels' on 9th December 2011 (Lynam, 2011).

Estimates for the revenue generated by the FTT vary, because its impact on trading volumes is unknown. Since volumes fall as spreads rise, Schmidt estimates that a one per cent increase in spreads results in a 0.43 per cent fall in volume: the 'elasticity of foreign exchange volume with respect to the spread' is -0.43 (Schmidt, 2008, p. 4). At a rate of half of one basis point the revenue was estimated at around two billion US Dollars with a decline in trading of only a few percentage points (Spratt, 2005, p. 6). Another difficulty with this literature is that the elasticity and volume estimates are during times when spreads are normal. After the failure of Lehman Brothers in September 2008, average spreads in major currency pairs increased (by rates between 60 per cent and 293 per cent) as did volume (by amounts between 28 per cent and 92 per cent) (Melvin and Taylor 2009, Table 2). In other words, the effect on speculative capital inflows during normal times would be small, and the effect on speculative capital outflows would be insignificant because of the dislocation caused by higher spreads. The effect on foreign exchange spot transactions, because they are excluded, would be zero.

³ See also (Davidson, 2005; Schulmeister, 2010; United Nations, 2009)

Other financial markets show that taxes can be applied at a higher rate. The UK applies a 0.5 per cent tax on securities trades, and this is collected cheaply via existing settlement systems (a collection cost of 0.11 per cent per unit of tax raised, compared to income tax at 1.59 per cent) and with fairly stable tax revenues of around 3 billion Sterling per year (Bijlsma, Lever, Anthony, and Zwart, 2011, p. 10). Despite this evidence, the literature is generally dismissive, citing evidence of failure to implement local transaction taxes, and their ‘negative effects on price discovery, volatility, and liquidity (leading) to a reduction in market efficiency’ (Habermeier and Kirilenko, 2003, p. 177).

The last two options in Keynes’ International Clearing Union proposal – to eliminate cross-border foreign exchange risks and to penalise creditors and debtors equally to encourage equilibrium – are discussed together. Whilst a Tobin tax or FTT ‘might throw some sand in the wheels’, Keynes’ idea would penalise both creditor and debtors as global imbalances grew.

To illustrate this, consider the imbalances that exist between countries in the Eurozone. **Chapter Five** discusses how the European Central Bank (ECB) has begun to manage its reserve assets to drive down the spread between yields on sovereign debt in deficit and surplus countries – a policy that has gone a long way to reduce punitive borrowing costs in some Eurozone countries – but the adjustment costs continue to fall on the deficit countries because their borrowing costs are higher. A global imbalance tax, when the financial and capital account are open, would penalise transactions on the current, capital and financial account whenever they exacerbate imbalances – and transactions might be tax free if they reduce a trade deficit or financial surplus:

	Current	Capital and Financial
Taxed transactions	Purchase of new BMW by Greek resident; dividend payment from Greek business to German resident	Greek deposits placed in German bank; Greek resident purchase of German house
Untaxed transactions	Purchase of Greek wine by German resident	Purchase of Greek bonds by German resident

***Table 2.1.** Applying a global imbalance tax to current, capital and financial transactions between Greece and Germany*

However, the FTT does not apply to cash transactions. If it did, exempting the purchase of a BMW based on residency would be difficult, given freedom of movement within the Euro area. One solution would be to apply the FTT to all cash transactions and give tax rebates to domestic transactions – but since most household transactions would be exempt, that solution seems unwieldy. The original Keynes proposal would introduce a separate unit of account for trade between countries, perhaps by re-introducing the Deutsche mark and Greek drachma at parity to the Euro but exempting them from the FTT (while making the Euro illegal except for settlement between central banks). Practically, the imbalances between Euro central banks could be taxed, which is effectively what the ECB does when it offers liquidity to banks at a positive interest rate and accepts liquidity at a negative interest rate (European Central Bank, 2014).

However, compared to other fiscal policies, are these rates sufficient that speculative flows will reduce imbalances between creditors and debtors? The effects in **Table 2.1** could be achieved by raising consumption taxes in Greece compared with Germany, and vice-versa with capital taxes. According to Eurostat, Greek consumption taxes are higher than Germany – which bodes well – but Greek capital taxes are also higher (Eurostat, 2013, p. 29) because Greece is constrained by the Maastricht rules on government deficits: the same treaty that saw a surge in bond issuance in 1993 (**Chapter One**). In other words, the ECB has probably done as much as it can within its

mandate, but it will require a major shift in fiscal policy to rebalance speculative flows in Europe.

Forbidden fruits

The ‘forbidden fruits’ include debtor-friendly policies that were embraced by developed countries since the GFC. Of these, QE and near zero interest rates dominated the policy landscape, buying up existing financial assets (normally sovereign debt) and reducing borrowing costs to near zero. These, and their relationship to fiscal policy, are discussed in **Chapter Three**.

Other ‘forbidden fruits’ include debt forgiveness; reducing the precedence given to financial contracts under bankruptcy law; and making certain types of speculative contract unenforceable in international law. Graeber calls for a Biblical-style Jubilee to cancel the debts of the poor (Graeber, 2011) an idea taken up by the Jubilee Debt Campaign (Jubilee Debt Campaign, 2014); Keen suggests the ‘system should be temporarily nationalised... (and) the debt must be reduced, whether by monetary means or outright debt moratoria’ (Keen, 2009, p. 21). **Chapter Seven** considers these proposals using a simulation model to compare household bailouts, and compares this to bank bailouts and a Keynesian boost for businesses.

The proposal to remove legal support for derivatives contracts is that there is no cheaper form of government intervention (in a market) than refusing to intervene to enforce a contract. Speculators would avoid derivative deals with counterparties unless they were confident that counterparty could meet their losses, either by providing collateral upfront or by trading through centralised exchanges. **Chapter Seven** presents some empirical support that the US Commodity Futures Modernization Act (CFMA) in 2000 marked a turning point in US financial fragility, as it was followed by rapid growth in the securitisation of US household debt. Prior to the CFMA, legal enforcement was only afforded to derivatives contracts used for hedging and others were declared as ‘purely speculative contracts to be legally unenforceable wagers’ (Stout, 2009, p. 30). Not only that, but derivatives, swaps and repos ‘enjoy special status in bankruptcy.... (they) are exempted from the automatic stay (an injunction on the actions of creditors), and through netting, closeout, and collateralisation

provisions, they are generally able to immediately collect payment from a defaulted counterparty. Taken together, these provisions effectively make derivative counterparties senior to almost all other claimants in a bankruptcy' (Bolton and Oehmke, 2012, p. 1).

Conclusions

There are alternatives to the Washington Consensus: fiscal policies that support long-term growth and capital flow management. However, the policies emanating from Washington continue to be asymmetric: capital controls are an emergency measure and macroprudential policies are the order of the day. In response, the US brought in the Volcker rule to limit speculation and the UK will ring-fence retail from investment banks in 2019, a full twelve years after the GFC.

There have been proposals to reform international liquidity provision, based on five features of the Keynes plan: to eliminate bilateral clearing, minimise foreign exchange risks, discourage speculative capital flows and penalise creditors and debtors equally. The reforms in the UK and US focus on speculative capital flows within the banking sector: foreign exchange risks in the wider economy are generally excluded. Within Europe, the FTT is likely to have minimal effect on stability compared to monetary policy (negative deposit rates and ECB balance sheet operations) and the impact of fiscal policy. Under austerity, fiscal policy is unlikely to help rebalance Europe.

Debtor-friendly policies have also emerged since GFC. The most significant of these has been QE, which has reduced the yield on the higher government debts that followed the GFC. **Chapter Three** discusses the distributional effects of QE in more detail, alongside alternatives such as direct monetary financing of government deficits: fiscal-monetary policy. Other debtor-friendly policies which have been suggested are to forgive the debts of the poorest and to place speculators lower in the legal hierarchy.

CHAPTER 3: Challenges to macroeconomic theory

Introduction

Chapter One has already outlined major challenges to the idea that investment markets in general, and currency markets in particular, reach equilibrium: the decoupling of private lending, bond and equity markets from World GDP; leverage; tax avoidance; offshore finance; and the concentration of asset management in key financial centres. This Chapter extends that discussion to further examples: growth in central bank reserves; differences in currency issue; government deficit spending; major shifts in the yield on bonds and equities; and growing profit retention. The idea that financial behaviour changes and is influenced by finance theories is discussed in relation to the Modigliani-Miller theorem.

The model taught in Economics 101 is described to illustrate the importance attached to the interest rate and equilibrium. In particular, the assumption that under inflation targeting the international market for savings and investments will move towards equilibrium is challenged. The mixed record of economic forecasting is illustrated with three examples: inflation forecasts, growth forecasts and exchange rate forecasts. Since the GFC, QE has taken balance sheet effects into new territory, with spillovers in terms of distribution and asset prices. As an alternative to inflation targeting, the Chapter outlines proposals that monetary policy should target the exchange rate, using a combination of fiscal policy and financial regulation to manage the domestic economy.

The major theories and techniques of modern finance are outlined, to illustrate the importance attached in these models to liquidity, the assumption there are no limits to arbitrage (liquidity and the existence of a risk-free asset are taken for granted), and the assumption that the future can be predicted from the past. Finally, the carry trade is presented as a counterfactual that undermines inflation targeting, and challenges the idea that markets reach a natural equilibrium.

Further empirical challenges

Despite their small size relative to private lending, bond and equity markets, the annual growth of official central bank reserves is significant and is also outpacing GDP.

The Independent Evaluation Office of the IMF states that official reserve assets ‘remain small relative to global banking assets which themselves have experienced a leverage-induced “global banking glut”’ (Independent Evaluation Office, 2012, p. 8). By 2010, assets held by domestic and offshore financial centres had grown to over 25 times the size of official reserves (Independent Evaluation Office, 2012, p. 9) or about four times the world’s GDP. Like private lending, bond and equity markets, growth in official reserves has outpaced GDP across a wide range of economies:

	Foreign Reserves (in Billions)				Annualised Growth (2001-2012) ⁴
	December 2001		December 2012		
	In Local Currency	In US Dollars (at end of year spot rate)	In Local Currency	In US Dollars (at end of year spot rate)	
Swiss National Bank	88	53	491	536	23%
Federal Reserve	68	68	160	160	8%
Euro Area	399	355	800	1,055	10%
Bank of England	6.7	9.8	9.13	14.8	4%
Bank of Japan	4,250	32	5,750	69.7	7%
Brazil	63,248	30	756,926	416	27%
Russia	888	31	16,187	551	30%
India	2,326	50	15,697	309	18%
China	1,986	240	24,142	3,828	29%

Table 3.1. Official Foreign Reserves. Sources: IFS, WM Reuters spot rates

⁴ Calculated as $\left(\frac{2012 \text{ reserves in USD}^{1/11}}{2001 \text{ reserves in USD}}\right) - 1$

Understanding the relationship between central bank reserves and the exchange rate is a highly politicised question. The US Treasury Secretary, Timothy Geithner, interpreted growing foreign reserves less as a consequence of the US trade deficit and problems in the domestic economy, as more as evidence that ‘China manipulates its currency... (which) should be resisted through protectionist policies’ (Dooley, Folkerts-landau, and Garber, 2009, p. 5). In 2011, Congress introduced the Currency Reform for Fair Trade Act to permit countervailing duties (tariffs) against any foreign country with a ‘fundamentally undervalued currency’ (Levin, 2011), although this was not enacted. There are similar narratives in China about ‘currency wars’ (Hongbing, 2013).

Secondly, there is the challenge posed by variations in the amount of paper money issued by central banks and their use. Shown as a proportion of GDP, Japan issues more than other developed economies:

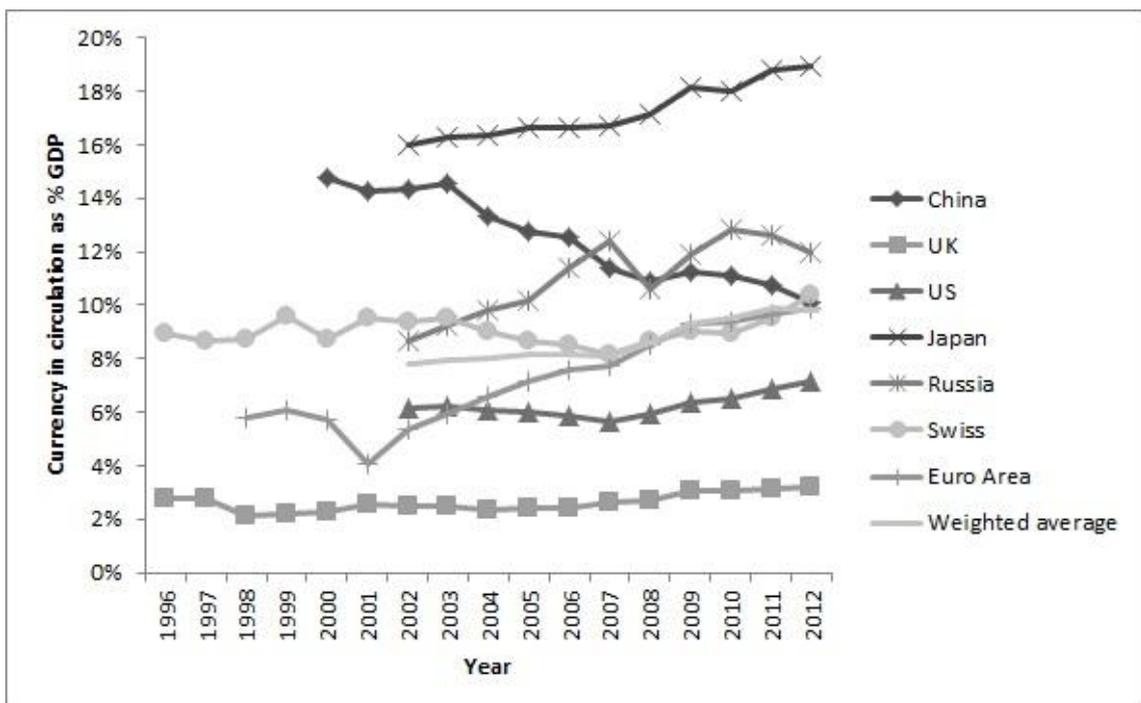


Figure 3.1. Currency in circulation as a percentage of GDP (IFS and OECD).

As already discussed in **Chapter One**, monetary financing of public deficits is a politically charged topic. There is nothing new about the idea of fiscal-monetary policy - Keynes wrote about filling ‘old bottles’ with banknotes and burying them ‘at suitable

depths in disused coalmines (so that...) there need be no more unemployment and, with the help of the repercussions, the real income of the community, and its capital wealth also, would probably become a good deal greater than it actually is' (Keynes 1936, p. 129). Monetary theory needs to account for differences between countries that have the institutional support of a domestic central bank, and those that have relinquished currency sovereignty to supra-national organisation like the ECB.

For example, across the Euro Area there are rigid arrangements relating to the issue of bank notes by national central banks 'in proportion to their respective share in the capital key of the ECB' (Scheller, 2004, p. 103). These already rigid arrangements were contested because they were thought to redistribute benefits to the detriment of Germany (Sinn and Feist 2000, p. 11) at a time when the foreign sector was thought to hold disproportionately more Deutschmark. The benefits that a country accrues when foreigners retain its currency are known as seignorage.

The rigid ECB arrangements share seignorage with national central banks on a GDP basis. These are direct benefits to the central bank because currency is swapped for interest-bearing reserves, typically government bonds. The ECB itself prints eight per cent of bank notes and puts these 'into circulation by the (national central banks), thereby incurring matching liabilities vis-à-vis the ECB. These liabilities carry interest at the main refinancing rate of the ECB' (Scheller, 2004, p. 103). In other words, the ECB distributes income from their currency issues, but retains a proportion to fund their activities.

Information on the issue of high denomination notes gives an indication of their role in foreign currency transactions. Until 1969 the US Treasury Department was printing 10,000 US dollar notes for bank transfer payments, and there was even a 100,000 US dollar 'Series 1934 Gold Certificate' for central bank transfers (US Department of the Treasury, 2013a). For the US, an estimated half of the growth in currency issue since 1988 is due to foreign holdings, with about three-quarters held as the highest denomination 100 US Dollar bill (Judson and Judson, 2012, p. 8). In 2002, a 500 Euro denomination note was issued; Japan has issued a 10,000 Yen note since 1958. The 1000 Swiss franc note, first issued in 1907 and the highest denomination currency

among the G7, is estimated to account for 60 per cent of the value of Swiss notes in circulation (Swiss National Bank, 2013b). Statistics on the use of high denomination notes for 'nefarious activities domestically (tax evasion, other crime, gambling, drugs, prostitution, etc) are unavailable. By the same token... huge foreign money holdings can be attributed to international criminal activity and also to dollarization in countries with a high inflation record and an unstable political environment' (Drehmann, Goodhart, Krueger, Boldrin, and Rose, 2002, p. 197). Were non-residents to exchange these notes for domestic currency en masse, the Bank of Japan, Federal Reserve and Bank of England would not have sufficient foreign currency reserves to meet their obligations. In other words, high denomination notes play an important, if uncertain, role in foreign exchange markets.

However, the causal relationships between government debt, private debt and economic indicators are highly contested. The 'fiscal multiplier' measures the extent to which government spending impacts GDP: a multiplier of one or above indicates that every unit of government spending increases GDP by one or more units. Estimating the multiplier is essential to the debate on government austerity, because a low multiplier would imply that governments are better off giving tax breaks than using their income for investment spending. The IMF have admitted that their earlier 0.5 estimate for the fiscal multiplier had underestimated the effects of austerity on GDP because 'the actual multipliers were substantially above 1 early in the crisis' (Blanchard and Leigh, 2013, p. 19). This suggests that government austerity after the GFC actually made recovery from the GFC more difficult.

The polarisation of the public debate on government deficit spending was brought sharply into focus when Thomas Herndon, a graduate student in economics at the University of Massachusetts Amherst, found errors in a much-cited paper on austerity. The Harvard authors, Reinhart and Rogoff, had been arguing that public debt beyond 90 per cent was detrimental to growth. The response from Herndon was that the paper had numerical errors which, when corrected, show a steady decline but no tipping point: 'average GDP growth at public debt/GDP ratios over 90 percent is not dramatically different than when public debt/GDP ratios are lower' (Herndon, Ash, and Pollin, 2013, p. 3). Other research supports Herndon et al., finding 'no visual evidence

for a turning point or structural break in the relationship between debt and growth at higher debt ratios... (after accounting for) lagged growth, the relationship between the debt ratio and the 5-year forward growth rate is essentially flat for a debt ratio of 30 [debt to GDP] or more' (Dube, 2013, p. 9).

Private debt needs to be considered alongside public debt: as shown in **Chapter One**, private debt is growing in a wide range of developed economies and tax avoidance undermines the ability of governments to meet their interest payments. Research shows a correlation between low growth and high levels of corporate and household debt (Cecchetti et al. 2011, p. 1), although the argument for government austerity continues to be repeated, with reports such as the May 2013 ECB monthly bulletin calling for an 'appropriately prudent policy stance' in Greece, Portugal, Ireland, Italy and Spain (European Central Bank, 2013a, p. 95).

These wide variations in private debt, seignorage, central bank reserves and arrangements, public debt and growth suggest that macroeconomic theory needs to account for institutional balance sheets; there is unlikely to be a one-size fits all macroeconomic theory. However, understanding balance sheets is only part of the problem: there are also shifts in investment behaviour to explain.

For example, there are shifting patterns in bond and equity yields that require explanation. The free float era began with the cost of government borrowing at rates that were much higher than they had been in the Bretton Woods era: during Keynes' lifetime the yield on government debt had reached new lows. Historical data from the US shows equities gave a higher yield than bonds from the 1870s to the 1960s. With government policies that promoted industry and growth, the 1950s and 1960s were described as a 'Golden age of economic development' (Adelman, 1999, p. 16).

Figure 3.2 compares the yield on equities with the yield on government bonds for the US, UK and Japan: the yield on equities is the distributed profit (dividend) and the yield on government bonds is the coupon payment including redemption. In the US, the 'Golden age' of cheap government borrowing broke down around 1959: thereafter, the yield on equities was lower than the yield on government bonds until after the

GFC. The available data for the UK and Japan show a similar pattern of declining yields and relatively high bond yields from the 1980s:

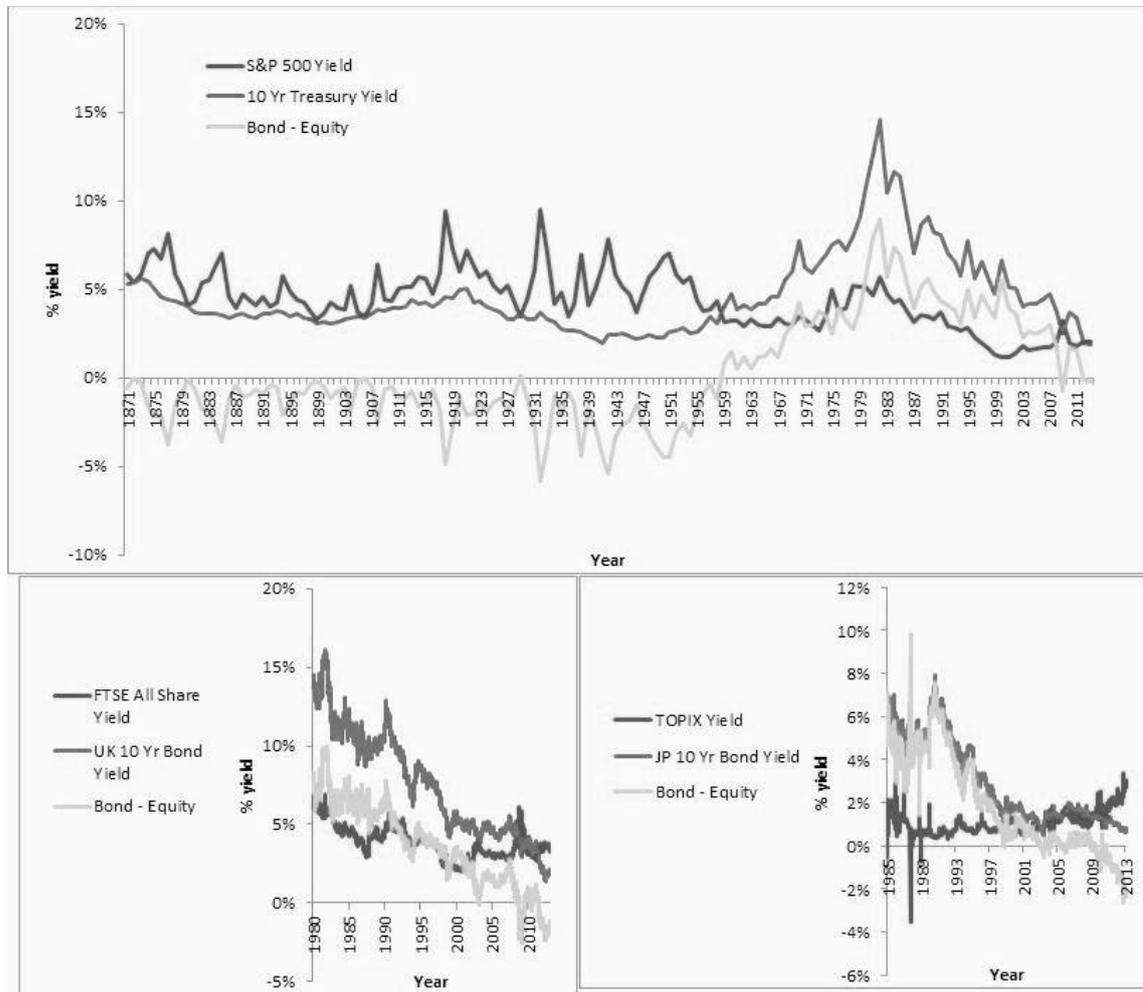


Figure 3.2. The redemption yield on government bonds compared to the yield on equities. US data from (Shiller, 2013); UK 10 year bond redemption yield and FTSE All-Share index yield (Datastream); Japan 10 year bond redemption yield, with the TOPIX yield calculated from price and total return indices, hence the irregularities (Datastream).

The fall in the equity yield below the government bond yield in 1959 is a remarkable coincidence with the publication date of the Modigliani-Miller theorem on optimal capital structure (Modigliani and Miller, 1958). This theorem says that ‘the value of the firm is completely independent of the capital structure’ (Modigliani and Miller, 1958,

p. 277) and an investor should not be concerned about the ratio of debt to equity because ‘the only difference (between a business raising capital through debt and through equity) is that due to the tax effect’ (Modigliani and Miller, 1958, p. 296).

This key insight is presented as the ‘gain from leverage’ according to this formula (Miller, 1977, p. 267)⁵:

$$\text{Equation 3.1: } G_L = \left[1 - \frac{(1-r_c)(1-r_{ps})}{1-r_{pb}} \right] B_L$$

Where G_L = gain from leverage; r_c = corporate tax rate; r_{ps} = personal tax on income from equities; r_{pb} = personal tax on income from bonds; B_L = market value of firm’s debt

This formula has major implications for corporate debt. First, if all tax rates are zero there are no gains from leverage: in a world without taxes there would be no corporate debt. When the corporate tax rate is positive and personal tax on bond income is the same as, or below that of, equities ($r_{pb} \leq r_{ps}$) there is a positive gain from leverage: deleveraging requires taxes on bonds to be raised above those on equities ($r_{pb} > r_{ps}$) or for the redemption yield on corporate debt to fall below zero (debt deflation).

Chapter One has already shown high, and increasing, leverage across a panel of developed economies, in particular Luxembourg, Ireland, the UK and the Netherlands. There is also evidence for a long-term decline in the distribution of profits, as shown in **Figure 3.3** for the US. The intercept in 1871 shows profit retention was averaging around 24 per cent with an increase of 0.02 per cent per month (0.25 per cent per annum); in 2011, after 147 years, profit retention was averaging around 60 per cent. The exceptions to this trend in the US were 1894-5, 1921-22, 1931-33 and 2008-9. It might be a coincidence, but the periods when profit retention is more volatile (peaks in

⁵ Interestingly, Merton Miller described these as ‘somewhat heterodox views’ (Miller, 1977, p. 261).

Figure 3.3.) coincide with periods of high capital mobility (peaks in **Figure 3.4.**, GFC is absent) and therefore periods of cross-border lending and borrowing:

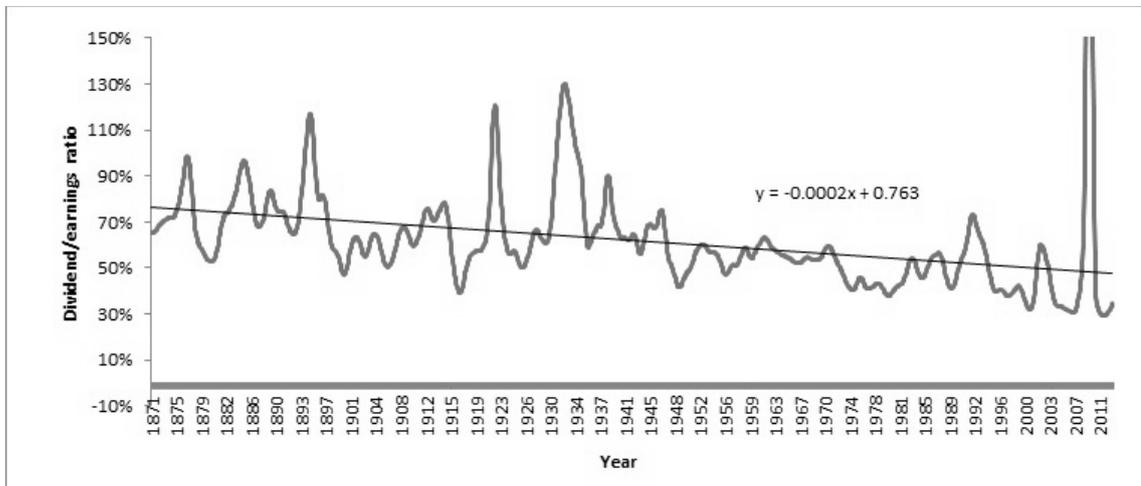


Figure 3.3. US dividend and earnings on the S and P Composite. Monthly data from (Shiller, 2013).

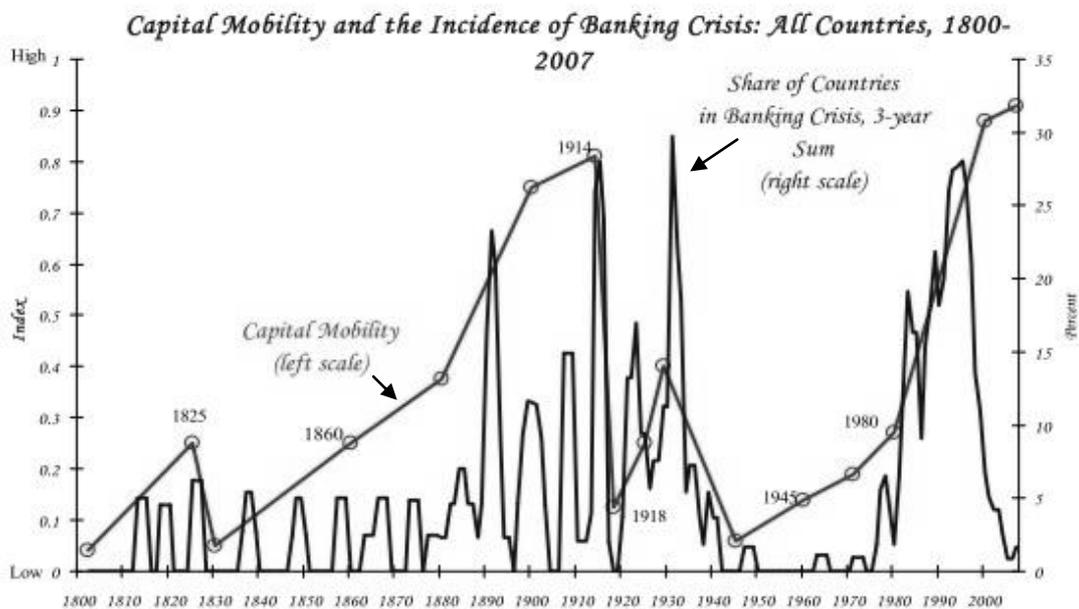


Figure 3.4. Reproduced from (Reinhart and Rogoff, 2008, p. 8, figure 3).

The increases in leverage and profit retention since 1959 are consistent with the idea that Modigliani-Miller was applied to firm financing and profits were accumulated offshore: the tax avoidance story in **Chapter One** where profits flow to a beneficial owner in a tax haven. Leverage is tax efficient when loan interest can often be offset

against corporate taxes (Barwell and Burrows, 2011, p. 20; Turner, 2010, p. 15). The net effect is a transfer of profit from equity-holders to bondholders and lenders.

The example of the Modigliani-Miller theorem reflects an idea that economic and financial theories should themselves be considered as devices that 'make(s) others act' (Muniesa, Millo, and Callon, 2007, p. 2). This idea is expressed by MacKenzie as follows: 'Economics does not describe an existing external "economy" but brings that economy into being: economics performs the economy, creating the phenomenon it describes' (MacKenzie, 2003, p. 108).

In other words, we need an approach to macroeconomic theory that accounts for empirical findings, for changes in financial behaviour, and for finance theory itself having an impact on behaviour. When the same financial and managerial interests are deciding how to distribute profits, the degree of leverage, and financing decisions such as whether to issue bonds or equities, there are also regulatory implications. With the concentration of financial activity there may be greater opportunities for collusion, fraud and mis-selling.

Economics 101

The standard macroeconomic text book model, Economics 101, is outlined to illustrate the importance attached to monetary policy and inflation targeting as a tool for macroeconomic stability. The intention is not to set up a strawman, but to introduce a framework that can be extended to account for changes in behaviour; to assess the impact of relaxing assumptions; to allow for calibration of the model with real economic variables; and to include in the framework a plurality of institutional settings and balance sheets.

The Economics 101 model is a four sector economy: businesses, households, government and the external sector. At the core of this is a barter economy with just two sectors, businesses and households, where labour is exchanged for goods in a two market system (Gärtner, 2003, p. 7). In that barter economy, the sum of all income in the labour market is equal to the sum of all spending in the goods market. Adding government, an external sector and a monetary economy introduces a second loop with leakages and injections to the barter economy. Leakages are a reduction in the

flow due to factors such as household saving, imports and government taxes; injections are an increase in the flow due to factors such as business investment, exports and government spending.

To complete the Economics 101 model, households are assumed to have a marginal propensity to consume (c) such that an increase in personal disposable income leads to either consumption or saving (s , where $1-s = c$). These assumptions give rise to the circular flow identity (**Equation 3.2**), the consumption function (**Equation 3.3**) and the equation for GDP (**Equation 3.4**):

Equation 3.2: $(S - I) + (T - G) + (M - X) = 0$

Equation 3.3: $C = cY = Y - T - S$

Equation 3.4: $Y = C + I + G + X - M$

Where S = savings, I = planned investment, T = taxes, G = government spending, X = exports, M = imports, C = household consumption, c = marginal propensity to consume, and Y = GDP

GDP can also be determined from looking at Gross National Income - wages, dividends distributed to households, net household interest income and household taxes:

Equation 3.5: $Y = WB + F + INT_b + T_b + X - M$

Where WB = wage bill; F = distributed and undistributed profits; INT_b = business interest payments; and T_b = business taxes

By assuming that the accounts are closed, in the sense that Gross Domestic Product is equal to Gross National Income, a number of accounting identities follow. If government ran a balanced budget, and there was no trade surplus or deficit, then 'little room was left for banks and financial intermediaries and the accounts were closed on the basis of the famous Keynesian equality, that saving must equal

investment' (Godley and Lavoie, 2007, p. 23). These accounting identities can be illustrated as a grid, with each sector as a column and economic activities as rows:

		Firms			
	Households	Current	Capital	Government	Σ
Consumption	$-C$	$+C$			0
Government expenditure		$+G$		$-G$	0
Investment		$+I$	$-I_f$		0
GDP		Y			0
Wages	$+WB$	$-WB$			0
Profits	$+FD$	$-F$	$+FU$		0
Taxes	$-T_h$	$-T_b$		$+T$	0
Interest payments	$-INT_h$	$-INT_b$		$-INT_g$	
Σ	S_h	0	$FU - I_f$	$-DEF$	0

Table 3.2: Basic accounting framework. Source: (Godley and Lavoie, 2007, p. 33)

Where WB = wage bill, FD = distributed profits, FU = undistributed profits, INT_h = household interest payments, T_h = household taxes and DEF = government deficit

From the bottom row:

Equation 3.6: $S_h + (FU - I_f) - DEF = 0$; and $S_h + S_f + S_g - I = 0$

Where S_h = household saving, S_f = firm saving and $S_g = -DEF =$ government saving

If we accept even the simple premise that this model of Economics 101 can have multiple equilibria or be in disequilibrium, then we should accept that economics is not an exact science. Consider **Equation 3.2**. When the current account deficit is growing and the private sector is neutral ($M-X > 0$ and $S-I=0$), should the government invest (T-

$G < 0$) to boost domestic growth, should the central bank lower the interest rate to encourage private investment ($S - I < 0$), or both? Consider the same equation when the current account is neutral and the private sector is not saving ($M - X = 0$ and $S - I < 0$): should the government run a surplus ($T - G \geq 0$), should the central bank raise the interest rate to encourage private saving, or neither? Finally, if the current account deficit is growing and the private sector is not investing ($M - X > 0$ and $S - I > 0$) and interest rates are already zero, is there any alternative but for government deficit spending to boost investment ($T - G < 0$)?

These examples reflect the idea presented in **Chapter One** that there can be periods, particularly at zero interest rates, when 'monetary policy, fiscal policy and debt management [] become joined at the hip' (C. Goodhart, 2012a, p. 129). Through this lens, the difficulty for policymakers is deciding whether the economy will respond best to monetary or fiscal policy. Economics 101, with three sectors, and with three possible states (levels that are in equilibrium, rising, falling), might move further away from equilibrium if sectors respond differently to fiscal or monetary policies.

From this perspective, the idea that a single, monetary policy instrument can be effective seems simplistic, given there are different interest rates and investment returns in each sector. A more fully-described model could take account of these differences across a wide variety of financial assets (bonds, equities, loans, reserves); the impact of other factors on these flows (income taxes, wealth taxes, capital gains and losses, loan defaults, dividends, coupons); the impact of other sectors and institutions (central banks, offshore finance, and different types of firm and household); and the impact of changes in behaviour (such as demographics, migration and financial behaviour).

Investment decisions

The strawman within Economics 101 is the idea that, under inflation targeting by the central bank, international savings and investments will reach equilibrium through price adjustments. For Keynes, investment decisions are determined by three factors: the yield on the investment (q), the interest rate or carrying cost (c) and the liquidity premium (l) such that 'the total return expected from the ownership of an asset over a

period is equal to its yield minus its carrying costs plus its liquidity premium, i.e. $to q - c + l...$ ' (Keynes 1936, p. 143) where interest was a 'reward for parting with liquidity... a measure of the unwillingness of those who possess money to part with their liquid control over it' (Keynes 1936, p. 109). Raising the interest rate would result in fewer investment projects being viable, and vice-versa.

This description of the investment decision was criticised by Minsky who wrote that Keynes' 'discussion of finance and portfolios, and how they relate to the pricing of capital assets and the pace of investment, is muddled' (Minsky, 1975, p. 69)⁶. In **Chapter Seven**, Minsky's insights on shifts in financing behaviour are explored more fully in a partial model, to understand if behaviour might explain differences in interest rates between economies. In particular, does financial leverage and the re-financing of existing projects when interest rates are low lead to a permanent or semi-permanent increase in asset prices and reduction in yield? Financial deregulation has increased the possibilities to bundle, dice and sell on the risk from financing decisions, meaning it can be profitable to leverage an existing investment when interest rates fall: under these circumstances does financial sector investment crowd out investment in real production? For the financial sector, restructuring the investment book generates fee income without a single brick being laid or non-financial job being created. This is explored more fully in **Chapter Eight**.

Uncertainty over the impact of interest rates on international capital flows weakens the usefulness of monetary policy in tackling domestic problems. The consequences of lower interest rates include leverage, cross-border lending and borrowing, and rising asset prices. Additional financial sector activity might give a temporary boost to the economy, but if the consequence is higher leverage, the economy becomes increasingly fragile.

Capital markets take control

Yet the prevalent view, after the brief flirtation with monetarism described in **Chapter One**, was that the government (along with everyone else) should bow to the capital markets. As respondent ALADDIN put it: 'the Bank would say "Oh, I think that would be

⁶ Despite these criticisms, it is clear that Keynes's work has had an impact and relevance that is far beyond the scope of this thesis (for an overview, see Skidelsky, 2010).

very difficult in the markets, you may get a rather abrupt move to interest rates or it could lead to a funding strike or..." the Bank would come up with all kinds of reasons not to do whatever it was the Treasury wanted to do, on the basis of its alleged superior knowledge' (ALLADIN interview, 2012).

By putting capital markets in control, monetary policy is elevated above fiscal policy because of the fear that an unbalanced budget will increase debt servicing costs. The institutional force here is the market, to which governments, central banks, Treasuries and debt management office should bow. Under these conditions, targeting consumer price inflation became the mandate of central banks. This was the birth of New Consensus Macroeconomics (NCM), 'was made possible after the collapse of the Grand Neoclassical Synthesis in the 1970s' (Arestis, 2009, p. 2).

Inflation targeting is based on the search for a natural rate of interest that reflects 'the (constrained) efficient level of economic activity... monetary policy cannot create persistent departures from the natural values without inducing either inflationary or deflationary pressures... these new models identify an important challenge for central banks: that of tracking the natural equilibrium of the economy, which is not directly observable' (Gali and Gertler, 2007, p. 27-28). There are echoes here of Wicksell for whom the natural rate of interest was 'the rate of interest at which the demand for loan capital and the supply of savings exactly agree' (Wicksell, 1906, p. 193). The nominal interest rate must be positive or 'in an extreme case, the shortest short-term rate may perhaps be nearly zero' (Hicks, 1937, p.155). The natural rate, which is the nominal rate minus inflation, can therefore drop below zero. Under these conditions there is no equilibrium between savings and investment: the zero lower bound. Investors prefer to hold cash because a zero rate bond carries both a default risk and the risk of a capital loss if the interest rate rises. 'After the rate of interest has fallen to a certain level, liquidity preference may become virtually absolute in the sense that almost everyone prefers cash to holding a debt which yields so low a rate of interest. In this event the monetary authority would have lost effective control over the rate of interest' (Keynes 1936, p. 132).

To his credit, Keynes argued in *The General Theory* that at the zero lower bound expansionary fiscal policy was necessary to restore confidence. The combination of a positive inflation rate and zero lower bound on the nominal rate was described by Keynes as the 'liquidity trap' from which only fiscal policy could rescue the economy: the public sector steps in as an 'investor of last resort' and maintains GDP while the private sector recovers. Fiscal policy includes not only investment but might extend to a progressive taxation system and the government acting as an automatic stabiliser by providing basic income in the event of large-scale private sector unemployment. Since the poor have a greater propensity to consume, government stabilisers maintain demand in a recession. More active fiscal policy targets government investment such as infrastructure, basic research and education. A combination of automatic stabilisers and supply-side expansionary policies were the order of the day during the GFC when we were 'all Keynesians in the foxhole' (Lucas, quoted in Skidelsky, 2011, p.5).

However, what role did inflation targeting play in creating the conditions for the GFC? The relationship between interest rates and inflation under NCM is far from intuitive. If rates are lowered do households increase spending because their debt-servicing costs have fallen, or do they take out new loans to invest in existing assets such as property? When rates are raised, do businesses pass on their higher costs as price increases, or use their profits to pay down existing debts, or resist wages rises to cut costs?

Under NCM 'modern central banking can be described as the management of private expectations' (Arestis, 2009, p. 6). Monetary aggregates are almost entirely absent because the interest rate is assumed to clear the market between savings and investments. For example, **Equation 3.7** shows how NCM determines the exchange rate with only the current account as a monetary aggregate:

$$\text{Equation 3.7: } rer_t = d_0 + d_1 [(R_t - E(p_{t+1})) - (R_{wt} - E(pw_{t+1}))] + d_2 (CA_t) + d_3 E(rer_{t+1}) + S_4$$

Where rer_t = real exchange rate, R_t = nominal rate of interest, $E(p_{t+1})$ = expected domestic price levels, R_{wt} = world rate of interest, $E(pw_{t+1})$ = expected world price

levels, $CA_t =$ current account position, $E(rer_{t+1}) =$ expected future real exchange rate, $S_4 =$ stochastic shocks, $d_0 - d_4 =$ adjustment factors (Arestis, 2009, p. 4).

Forecast errors

The success of NCM models to track the path of the economy is mixed, particularly around the GFC. The Bank of England's record on three forecasts is highlighted here: inflation, GDP and the exchange rate. Their record confirms Arestis and Sawyer, who point to survey data which shows that NCM was not very good at influencing the things it was supposed to: aggregate demand and the domestic output gap. While interest rates have shown a weak effect on inflation 'there (are) more substantial effects on real variables, especially on investment' (Arestis and Sawyer, 2006, p. 849). Neither is price stability an indicator of financial stability - it preceded the Great Depression in the USA in the 1930s, the problems in Japan in the early 1990s, and the bursting of the dot-com bubble in March 2001.

In the Bank of England model, the assumption that currency markets are self-regulating is explicit. The 2005 manual for their quarterly model states that when 'the economy is completely small and open in capital markets, Uncovered Interest Parity is a standard no-arbitrage condition that prices the exchange rate to equalise the return on riskless domestic and foreign bonds' (Harrison et al., 2005, p. 43).

Figure 3.5 shows that the Bank of England model was prone to overestimate inflation and underestimate growth prior to the GFC: this would suggest the bank kept interest rates artificially high for their inflation target from 1999 to 2007. Since the GFC, the model has underestimated inflation and overestimated growth, meaning the bank kept rates artificially low for their inflation target after 2007:

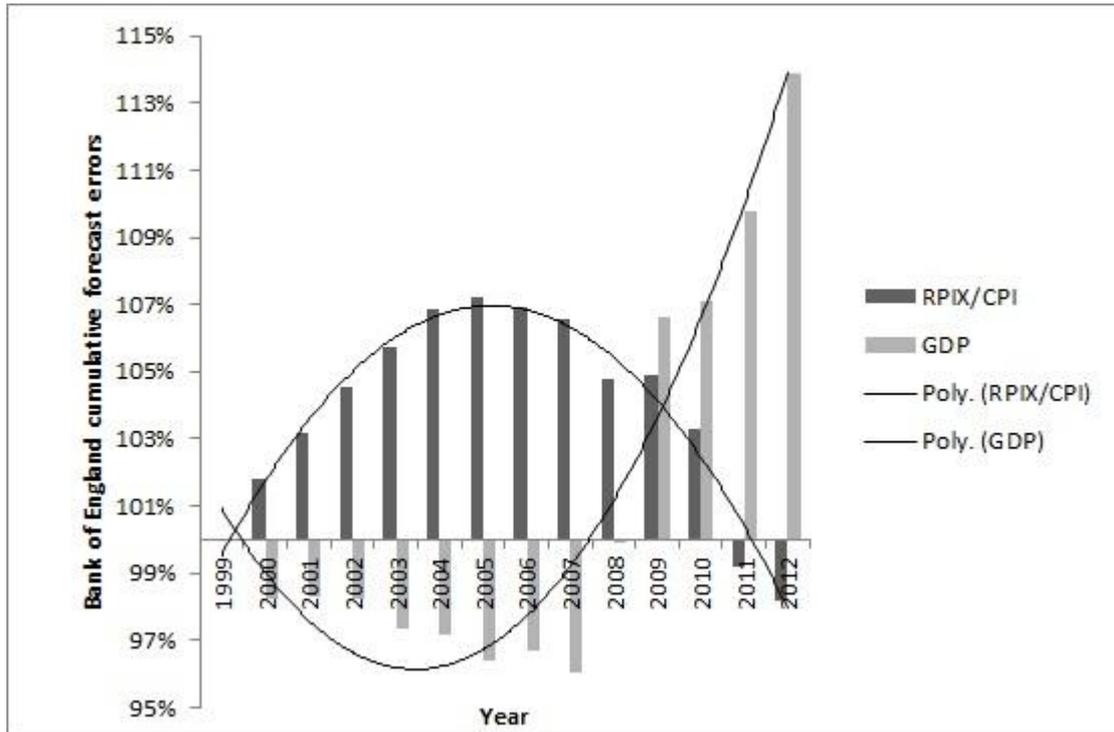


Figure 3.5. Bank of England cumulative GDP and inflation forecast errors. Sources: Bank of England Inflation Report and Office for National Statistics.

Research by Wadhwani shows a similar problem with the Bank of England model where ‘the exchange rate has (until November 1999) been forecast under the assumption of the textbook uncovered interest rate parity (UIP) hypothesis’ (Wadhwani 2000, p. 303). **Figure 3.6** shows the bank was predicting currency depreciation when there was a near-35 per cent appreciation of the currency:

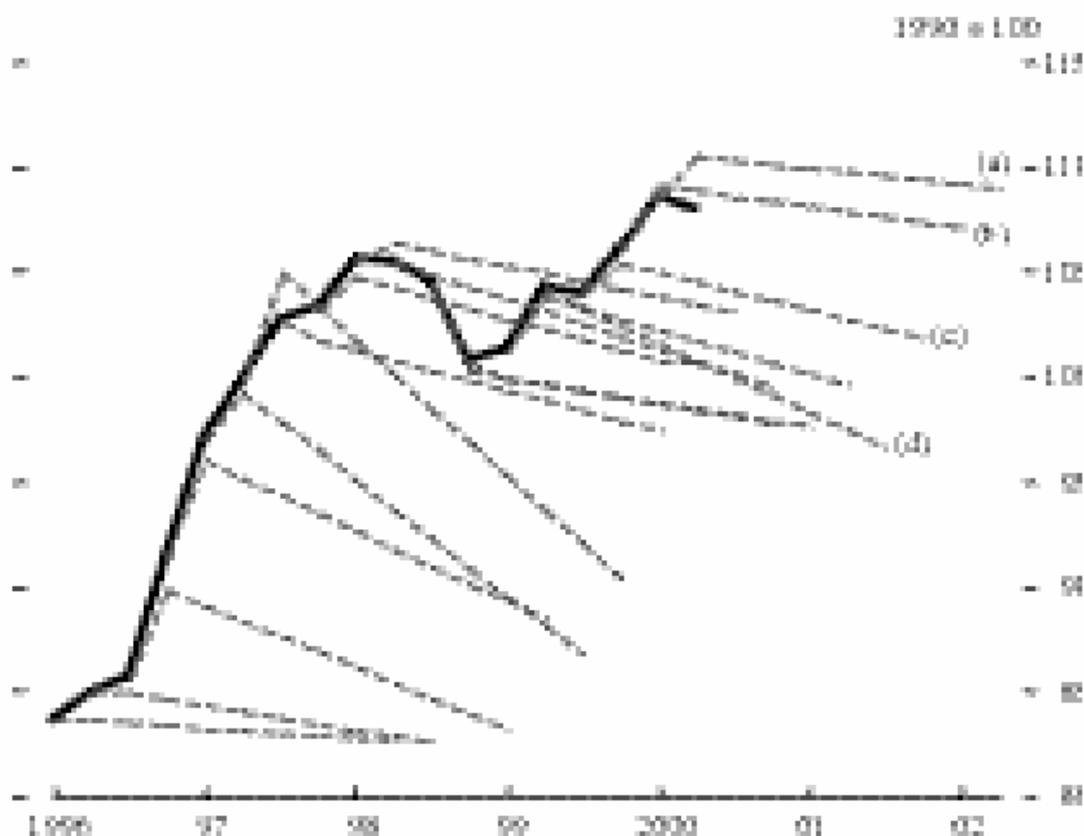


Figure 3.6. UK Exchange Rate Forecasts 1996-2002. Source: (Wadhvani, 2000, p. 304);
forecast = dashed lines, actual = black line

Wadhvani suggests this was because the BoE was using high interest rates to rein in an asset price bubble in the UK housing market. Instead, high rates attracted capital inflows in search of carry trade profits, and the currency appreciated in violation of UIP. With interest rates as the only macroeconomic tool, they were being used to dampen growth but had the opposite effect, driving investment and consumption. The fact that foreign savings made their way into domestic lending reflects the need for economic models to more fully account for investment flows. These flows are a feature of fully liberalised capital markets, and suggest that the domestic economy might be better managed by financial regulation and fiscal policy.

The fact that the UK exchange rate appreciated when the UK had large trade deficits suggests that the exchange rate might be a suitable alternative policy target: keeping interest rates low to avoid capital inflows and relying on other policy tools (taxes or stricter lending requirements) to rein in asset bubbles. A monetary policy focus on low

exchange rates would help the UK to reduce significant trade deficits. Arestis and Sawyer also suggest targeting the exchange rate via monetary policy:

It is well known that one policy instrument can, at most, achieve one policy objective. Fiscal policy may have some indirect effects on the exchange rate, via effects on trade position and on market sentiment, but fiscal policy does not have direct effects in the way that monetary policy does. In contrast, interest rates directly affect international capital flows and can be anticipated to have some effect on the exchange rate (even if that effect is difficult to predict). This would suggest that fiscal policy should be directed to aggregate demand, and monetary policy towards the exchange rate.

(Arestis and Sawyer, 2006, p. 856).

The idea of using monetary policy to target exchange rates is not new; it was also proposed by Friedman (Friedman, 1968, p. 15) but he rejected it on the grounds that only five per cent of US trade was international. In 2011, this was no longer the case: US exports had risen to 20 per cent of the total and imports to 24 per cent (World Trade Organisation 2012, p. 14-15). Not that exchange rate targets work for everyone: within the Eurozone all regional trade is, effectively, denominated in foreign currency because monetary sovereignty has been relinquished to the ECB. For countries with monetary sovereignty, the disaggregation of the supply chain across countries and the pricing of commodities in US Dollars means that export goods often have a large foreign currency element.

Under NCM, modern central banking was reduced to the management of inflation with 'only a single rate of interest' and where 'no individual economic agent or firm is liquidity constrained at all. There is, thus, no need for financial intermediaries... or even money... it is rather amazing how such a non-monetary approach has been taken on board by central banks around the world' (Arestis, 2009, p. 5).

QE: a rational bubble or monetary finance?

After the GFC, monetary policy at the Bank of England entered new territory with QE. This policy had been practised at near zero rates in Japan, with a programme of QE or large-scale asset purchases by the Bank of Japan in 2001 (Spiegel 2001, p. 1). This policy was based on the New Keynesian suggestion that Japan can 'always inflate if it wants to, simply by increasing the rate of base money growth' (Krugman, Dominquez and Rogoff, 1998, p.197). As outlined in **Chapter One**, QE has since been carried out in the US, UK, Europe and Japan. As these programmes have progressed, the view is growing that 'the scope for further reduction becomes smaller as more purchases are carried out' (Meaning and Zhu, 2011, p.81).

There is evidence that QE lowers the interest rate: at the height of Japan's zero interest rate policy, the short-term rate averaged only six basis points and the long-term rate 129 basis point (Michl, 2010, p.3). However, QE has distributional effects that are of particular concern to progressive economists (Hudson 2010, p. 12; Stiglitz 2010). These include a Pigou effect whereby wealth is raised through a 'portfolio rebalancing channel' (Bank of England 2012b, p. 4): the market value of the domestic balance sheet is boosted by asset purchases, which in turn boosts consumption by the wealthy. 'Quantitative easing has undoubtedly had a positive effect on stock market prices. But most of it has not yet filtered into the real economy. It has bid up prices of existing assets, but not stimulated new investment' (Skidelsky, 2011, p. 7). Supporting asset prices helps those who already have wealth, but the consumption effects are secondary and might have very little impact on domestic jobs or investment if the wealthy prefer to spend their money on foreign goods. According to the Bank of England 'the Bank's asset purchases have increased the prices of a wide range of assets, not just gilts... but holdings are heavily skewed with the top 5 per cent of households holding 40 per cent of these assets' (Bank of England 2012b, p. 1). Providing liquidity support during crises reduces the pressure on those firms, banks or governments whose unsustainable business models led to a debt crisis in the first place. Rather than forced asset sales and a reconfiguration of the business environment, firms in difficulty can avoid an immediate default.

In contrast with the idea that liquidity provision supports creditors, Hellwig and Lorenzoni suggest that disincentives to default are endemic to the debtor. Hellwig uses liquidity constrained actors in his model where 'interest rates adjust downwards to provide repayment incentives to all the potential borrowing parties and 'low interest rates emerge in equilibrium' with inflated asset prices. For Hellwig and Lorenzoni, these 'positive levels of debt are sustainable... because the interest rate is sufficiently low to provide repayment incentives' (Hellwig and Lorenzoni, 2009, p. 1137): liquidity is demanded because further borrowing is preferable to default and debt restructuring. 'The circulation of fiat money requires that an intrinsically useless asset (a rational bubble) is traded at a positive price. The circulation of inside money instead relies on having the proper reputational mechanisms in place to guarantee that outstanding claims are honoured' (Hellwig and Lorenzoni, 2009, p. 1157).

A third perspective is that QE 'amounts to monetary finance of fiscal deficits... (that) is unlawful under the Treaty on the Functioning of the European Union (TFEU)' (Johnston and Pugh, 2014, p. 2):

Overdraft facilities or any other type of credit facility with the European Central Bank or with the central banks of the Member States (hereinafter referred to as 'national central banks') in favour of Union institutions, bodies, offices or agencies, central governments, regional, local or other public authorities, other bodies governed by public law, or public undertakings of Member States shall be prohibited, as shall the purchase directly from them by the European Central Bank or national central banks of debt instruments.

TFEU Article 123(1) cited in (Johnston and Pugh, 2014, p. 12)

If QE is considered to be fiscal, or fiscal-monetary policy, it provides liquidity support to both the private and public sectors: the beneficial impacts on the private sector are via the balance sheet, and on the public sector via a reduction in the cost of government borrowing. Yet, unlike government fiscal policy, liquidity provision is beyond the reach of the ballot box despite its ability to defer any '*suspicion of insolvency*' (Goodhart, 1999).

These contrasting views on central bank liquidity provision are examined in **Chapter Six**. If central banks provide liquidity support during public debt crises, we would expect these periods to be times when central bank interest rates are outliers. Alternatively, if central banks provide liquidity support during private debt crises we would expect these periods to show up as outliers. The results of this empirical work are presented in **Table 6.2**. Intervention during private debt crises would support the view that liquidity provision shifts solvency risk from the private to the public sector: unlike in Hellwig and Lorenzo, there will be no punishment of the private sector by ‘denial of future credit’ (Hellwig and Lorenzoni, 2009, p. 1141) if liquidity provision has deferred, or transferred, solvency risk.

The impact of finance theory

Earlier in this Chapter the Modigliani-Miller theorem, where firms can choose a debt to equity ratio to maximise their gains from leverage, was presented as a challenge to macroeconomic theory. Not only has leverage increased across a wide range of developed economies, but the empirical fact that equity yields fell below bond yields in 1959 when the theory was first published suggests we need to look beyond inductive and deductive methods to ask whether some ‘economic agencements’ can become self-fulfilling.

Chapter One has already detailed two such theories in the world of the modern finance theory where ‘both Expectations Hypothesis (EH) and Uncovered Interest Parity were expected to hold’ (Mehrling, 2011, p. 86). This section outlines a number of other finance theories to illustrate that they each have in common a liquidity assumption. This, perhaps, cannot be stressed enough: the provision of international liquidity to speculators binds these theories together.

Both EH and UIP have a no arbitrage assumption, which means that the profit opportunity will disappear if speculators have sufficient liquidity for arbitrage. Under EH, the long-term interest rate is a function of the short-term rate and a constant risk premium; and under UIP, low interest rate currencies are expected to appreciate and high interest rate currencies to depreciate. Speculators can ‘borrow in low-interest rate currencies and lend in high-interest-rate currencies, borrow in short-term markets and lend in long-term markets, borrow at the risk-free rate and invest in risky bonds...

significantly, all of these arbitrage trades depended on the availability of funding liquidity' (Mehrling, 2011, p. 86).

The assumption that investors are not liquidity constrained was also unstated in Modigliani-Miller, where firms can choose a debt to equity ratio to maximise their gains from leverage. Similar assumptions underpin the Efficient Market Hypothesis (EMH) which is 'the simple statement that security prices fully reflect all available information' (Fama, 1991, p. 1575): the assumption of the weak, semi-strong and strong forms is that investors will act on information and are therefore not liquidity constrained.

Two further techniques of modern finance, Modern Portfolio Theory (Markowitz, 1952) and the Capital Asset Pricing Model (CAPM) (Sharpe, 1964), assume there is no shortage of liquidity or shortage of the risk-free asset (normally defined as a government bond): this liquidity is exploited to construct a range of portfolios with different risk and return characteristics simply by adjusting the percentage of the portfolio that is invested in these liquid government bonds. Sharpe defines liquidity as 'the *price of time*, or the pure interest rate' (Sharpe 1964, p. 425) and an assumption of the Black-Scholes valuation formula is that liquidity is unlimited: 'it is possible to borrow any fraction of the price of a security to buy it or to hold it, at the short-term interest rate' (Black and Scholes 1973, p. 640). Derivative pricing relies heavily on the publication, by the British Bankers' Association (BBA), of benchmarks for short term interest rates like LIBOR, to be used as 'the basis for settlement of interest rate contracts on many of the world's major futures and options exchanges' (British Bankers' Association, 2014).

With no limits to arbitrage, the assumption is that investor can leverage and deleverage at will. For example, consider the risk-free rate shown here in the CAPM formula:

Equation 3.8: $E(R_i) = R_f + \beta_i(E(R_m) - R_f)$

Where $E(R_i)$ = expected return on the investment; R_f = risk-free rate; β_i = the beta of the investment defined as $\beta_i = \frac{\text{cov}(r_i, r_{\text{market}})}{\sigma_{\text{market}}^2}$; $\text{cov}(r_i, r_{\text{market}})$ = the covariance between the market and investment return; σ_{market}^2 = the variance of the market; and $E(R_m)$ = expected return on the market.

It is worth noting that there are empirical and theoretical challenges to these models. The carry trade is itself a challenge to these theories and this is the focus of the last part of this chapter and subsequent chapters. The empirical literature shows profitable trading strategies using information such as earnings, repurchases, simple trade timing, size, mutual fund discounts and momentum effects. The EMH theorises that these anomalies will disappear, on the assumption that speculators have sufficient liquidity.

The literature is rich with profitable trading strategies. Banz observed that smaller stocks had higher risk adjusted returns (Banz, 1981). US stocks prices were shown to under-react to earnings announcements in a large-scale study from 1974 to 1986, meaning information was only slowly incorporated into stock prices (Bernard, 1992). Repurchase announcements have been shown to lead to share price rises over several years (Ikenberry et al., 1995). The January anomaly (Bhardwaj and Brooks, 1992) was an observation that smaller stocks outperformed in the first few weeks of the year. The closed-end fund puzzle (Lee et al., 1991) was an observation that closed mutual funds often sell at a discount (or premium) to their net asset values. In US equity markets, long-lasting momentum effects have been found, with overreaction to price changes such that prior losers outperformed prior winners 'as late as five years after portfolio formation' (De Bondt and Thaler, 1984, p. 804). The assumption of a constant risk premium in EH has been empirically rejected for US bonds from 1952-2003 (Sarno et al., 2007). Lastly, assets that have lower volatility have been shown to outperform (Baker et al., 2001).

The use of statistical and mathematical methods can also be criticised. When constructing an optimal portfolio, the assumption is that historic risk (or volatility) is a proxy for future risk. 'The crisis, however, contradicted this predictability, to the

extent that events occurred that were so improbable ($1:10^{50}$) as to be virtually impossible' (Esposito 2012, p. 20). Yet the computational techniques generally assume a stable distribution of returns and treat perturbations, not as a permanent shift in the economy, but as a random shocks: this 'well-behaved process can occur only if the asset price (or pollen grain) is in *thermal equilibrium*' (Lance Taylor 2011, p. 276). The use of models is so endemic that one critic has written a 'defining characteristic is an insistence that certain methods of mathematical modelling be more or less always employed in the analysis of economic phenomena' (Lawson 2012, p.3). Or, as Piketty 'put it bluntly, the discipline of economics has yet to get over its childish passion for mathematics and for purely theoretical and often highly ideological speculation, at the expense of historical research and collaboration with the other' (Piketty 2014, p.32).

At the same time, the data themselves are unsuitable for statistical methods because of data gaps, inconsistencies and difficulties in their collection. The financial, capital and reserve accounts are reported net at the end of the accounting period, in US Dollars, so econometric approaches suffer from multicollinearity due to these currency effects. Foreign exchange profits and losses are made in the interim period between recording a flow in the current account, and valuing stocks at the end of the period. Currency conversion is an integral part of data collection.

Factors that are commonly used in regression analyses show a high degrees of correlation: there is a strong relationship between inflation and interest rates due to inflation-targeting (Gali, Gertler, and Galsí, 2007, p. 38) and between interest rates and exchange rates due to dollarisation (Habib and Stracca, 2012, p. 7). Non-stationary times series (trends) are common: 'over the full post-Bretton Woods era, in only 1.6 per cent of the episodes can a unit root be rejected for the base interest rate' (Obstfeld, Shambaugh, and Taylor, 2005, p. 426).

In other words, the challenges in understanding the investment decision are three-fold. First, there is the impact of liquidity on speculation: if speculators are liquidity-constrained, are profits higher? If speculators have too much liquidity, does the profit opportunity disappear or does the market overshoot? Secondly, what impact has finance theory had on the investment decision (such as the impact of Modigliani-Miller

on leverage)? Third, what impact does mathematical technique have? The coordinating feature of these theories is international liquidity provision.

The carry trade as a counterfactual

The assumption of unlimited liquidity (no limit to arbitrage) is a common theme in the techniques of modern finance. Yet within currency market, UIP, the carry trade, forward rate bias (FTSE International, 2010b) or forward discount bias (Froot and Thaler, 1990, p. 181) is probably the most persistent anomaly. In other words, the assumption that profits will be arbitrated away breaks down in the most liquid market of them all. According to the literature on market efficiency it should not be possible to forecast 'returns with variables like dividend yields and interest rates' (Fama, 1991, p. 1576). Provided the market is sufficiently 'large and free' the low interest rate currency is supposed to appreciate and the high interest rate currency is supposed to depreciate:

When, for example, the market is feeling unusually bullish of the European exchanges against sterling, or of sterling as against dollars, the pressure to sell forward sterling or dollars, as the case may be, drives the forwards price of these currencies to a discount on their spot rate which represents an altogether abnormal profit... this abnormal discount can only disappear when the high profit of arbitrage between spot and forward has drawn fresh capital into the arbitrage business.

(Keynes 1924, p. 129-130).

Instead, the observable phenomenon was that low (high) interest rate economies did not appreciate (depreciate): the null hypothesis for market efficiency was reliably false (Froot and Thaler, 1990, p. 182). So reliable was this that the carry trade was codified as investible indices. The FTSE Currency Forward Rate Bias Index Series (FTSE International, 2010a) is a simple product that makes equal trades, every month, that borrow in the low interest rate currency and invest in the high interest rate currency for all available currency pairs. The Deutsche Bank Global Currency Harvest Index ETF and Barclay's Capital Intelligent Carry Index ETN are 'constructed using a fairly

complicated mix of leverage and investment products and may not accurately represent the profitability of carry trade strategies in general' (S. Curcuru, Vega, and Hoek, 2010, p. 438). There are also momentum and trend currency strategies, such as indices from the Centre for International Banking Economics and Finance and Credit Suisse (Melvin and Shand, 2010, p. 4). The carry trade has been described as a 'pure source of alternative beta... (with)... a long-term return over 30 years that is comparable to that of global equities and superior to that of global bonds' (Record PLC, 2009).

Keynes described processes which might lead to deviation from this theoretical norm. When there are 'movements of capital, or reparation payments, or changes in the relative efficiency of labour, or changes in the urgency of the world's demand for that country's special products, or the like, then the equilibrium point between purchasing power parity and the rate of exchange may be modified permanently' (Keynes 1924, p. 97). These explanations fall, broadly, into two camps: either due to differences in real trade (in particular productivity in tradable goods) or are due to investment flows. The investment flow explanations can be extended to include behavioural models, risk premia, multiple equilibria, illiquidity, Peso problems, exorbitant privilege, dark matter and safe havens.

The real trade explanations

The idea that the carry trade is due to differences in the productivity of tradable goods is the 'Balassa-Samuelson hypothesis' (Balassa, 1964; Samuelson, 1964): higher productivity in tradable goods is theorised to drive up currencies such that 'the currency of the country with the higher productivity levels will appear to be overvalued in terms of purchasing power parity' (Balassa, 1964, p. 586). In fact, empirical research shows weak evidence for a link between the exchange rate and productivity in tradable goods. Much of the currency appreciation by Central and Eastern European countries transitioned to the European Union was due to the flow of investment money (Fischer, 2004). Some authors have suggested amending Balassa-Samuelson to include the effects of urbanisation (Karádi and Koren, 2008). Balassa assumed that services could not be traded, another assumption that could be relaxed,

raising the possibility of ‘an international equalisation of service prices’ (Balassa, 1964, p. 596).

As a counterfactual to the explanation that productivity or development can explain the carry trade, the FRB5 and FRB10 indices (for the G5 and G10 countries respectively) show broadly similar returns with remarkable consistency from 1980 to the GFC. This is despite wide disparities in productivity, urbanisation and technology over the sample period. Among the G5, Japan and the UK have shown higher productivity gains yet were at opposite ends of the spectrum: the Yen was stronger than expected for a low interest rate currency, and Sterling was weaker than expected for a high interest rate currency. In **Chapter Six**, the impact of the carry trade on the US (with its persistent trade deficit), Japan and China (with their trade surpluses) is explored in more detail.

The capital flow explanations

The Peso problem is the idea that the currencies of smaller economies have a risk premium. This would be consistent with CAPM, and the hypothesis that higher risk means higher returns is examined in more detail in **Chapter Six**. Under CAPM, an excess return is the reward for taking higher risk. The implication would be that smaller countries ‘command high risk premia: they feature a depreciated exchange rate and a high interest rate. Their risk premium fluctuates but remains stationary. As their risk premium reverts to the mean, their exchange rate appreciates’ (Farhi, Gabaix, and Stern, 2008, p. 2). As investors increase their risk appetite, they shift to the currencies of smaller economies, or the more volatile currencies, and vice-versa.

A second capital flow explanation is linked to the provision of international liquidity. The explanation is that underlying trends are exacerbated by momentum strategies that ‘yield surprisingly high unconditional average excess returns of up to 10 per cent per year’ (Menkho, Sarno, Schmeling, and Schrimpf, 2011, p. 40). In other words, there is so much international liquidity chasing these excess returns that they become self-fulfilling. The link between higher liquidity (volume) and the carry trade is also explored in **Chapter Six**.

There is secondary data that supports a link between liquidity and momentum in the carry trade. Survey data confirms that currency markets are dominated by technical trading strategies: 'roughly 90 per cent of market participants base their trading at least in part on technical analysis... moreover, the importance of technical analysis has increased more strongly over the 1990s than other trading practices like the orientation on fundamentals or on customer orders' (Schulmeister, 2006, p. 213). Of these 'the most common trading systems are moving average models and momentum models' (Schulmeister, 2006, p. 215) and there has been an increase in high-frequency and algorithmic currency trading (M. R. King and Rime, 2010, p. 29). Momentum traders search for a trend that they can follow, holding the position for a long time but making a small daily profit. Volatility traders exploit reversals, holding the position for a short time but making larger daily profits. A characteristic of momentum models is that they are underpinned by leverage and easy access to liquidity, with speculators taking positions that are of relatively short duration so they can deleverage when the carry trade reverses. Since leverage requires cheap funding, the global decline in interbank rates and in Yen funding in particular was a key factor 'to fund activities outside Japan' (Hattori and Shin, 2009, p. 386). However, not everyone agrees, with one foreign exchange manager attributing the carry trade to a shortage of liquidity: 'a well-established market inefficiency that arises due to constraints on real arbitrage, the availability of arbitrage capital, the long lags associated with real economic adjustments and the market's response to news' (Record PLC, 2010, p. 15).

A difficulty with rational reward literature is that currency returns vary depending on the perspective of the speculator: who is taking the risk? The US Dollar took on the role of a 'safe haven currency exactly at the time in which the US was exporting a once-in-a-generation financial crisis to the rest of the world' (Habib and Stracca, 2012, p. 1). However, a currency that gives a profit to a non-resident must, by definition, represent a loss to a resident (in terms of international purchasing power). The literature on safe havens shows that high interest rate currencies are vulnerable 'exactly when global risk aversion was high': safe haven is defined as both a large, open economy and an economy that is 'less leveraged and less open to capital flows'

(Habib and Stracca, 2012, p. 8). In other words, the safe haven role of the US Dollar is only applicable from some perspectives.

The dark matter hypothesis is that the countries like the UK and US, which have historically earned a higher yield on foreign assets compared to foreign loans, do so not because of carry trades but because the balance sheet is mis-measured. Dark matter is therefore estimated from the reported yield differential, on the assumption that investment income is a more accurate measure way to estimate stocks than measuring the balance sheet itself. The assumption is that, in equilibrium, currencies will yield different returns due to 'surprises, risk premia and embedded services (insurance and liquidity)' (Hausmann and Sturzenegger, 2006, p. 6). A similar view is that countries like the UK and US have an 'exorbitant privilege' that is mostly a consequence of trade in short term liquid assets (Gourinchas and Rey 2007, p. 12).

Critics say that 'the dark matter view fails, as it rests on an assumption that income streams are the most accurate items in the entire set of international accounts. Given that the bulk of income streams are not measured but are formed by applying estimates to estimates, this assumption is false. The exorbitant privilege view also fails... there is no evidence that the United States can earn its way to current account sustainability' (Curcuro et al. 2008, p. 19-20). In other words, when international accounts are being drawn up, the income streams are more likely to be estimated and are therefore more susceptible to error.

A model by Plantin and Shin suggests that speculation should be considered from the perspective of the low interest rate economy. In some ways, this is fairly obvious, given the carry trade needs a source of international liquidity. In their model, speculative carry trades 'unduly destabilise exchange rates by seeking to exploit the interest rate differences between advanced and emerging economies' (Plantin and Shin, 2011, p. 2). The model dynamics are a consequence of inflation targeting by central banks. Economies with higher interest rates get capital inflows, which result in a boom in investment and consumption (note that this is the mirror image of monetary policy in Economics 101 where the interest rate is lowered to encourage investment over savings). If the central bank in the country that receives capital inflows is inflation-

targeting, this leads to a vicious circle where interest rates are raised to dampen inflation, leading to yet more capital inflows and a vicious cycle. If some asset prices are included in the inflation target, such as housing, then the positive feedback is even greater, exacerbating the possibility of a sharp reversal in capital flows and the bubble collapsing.

Practitioners confirm that speculators unwind their positions rapidly. The Turkish Lira was relatively strong against Sterling after the GFC with relatively high interest rates, but ALADDIN refers to their concerns about short-term lending and an unsustainable current account in 2011 leading to an unwinding of the carry trade:

Last year (2011) we were very concerned about Turkish Lira... ahm... we trade Turkey in our EM fund... because it had a massive current account deficit, it was very strong, it had a high interest rate, we were very pleased with the money we were making but... we were concerned at the time because a lot of the current account deficit was financed through short-term inflow, so... you know, short-term bonds, positions taken in the equity market, speculation and so on... in fact, that unwound pretty spectacularly...

2012 interview with UK FX manager SPACEMAN

Three years later, after the 2013 unrest, a sharp currency depreciation and the election of Erdogan, Turkey's central bank has bowed to political pressure to move away from inflation targeting and cut interest rates (Dombey, 2014) in a move that will surely be watched closely by other emerging and developing economy central banks.

Hence, whether or not carry trades are destabilising needs to be considered from both domestic and foreign perspectives. However, within each economy there are other institutional forces at play, such as central banks accumulating foreign reserves or buying domestic bonds under QE. **Chapter Six** develops this as an empirical method using a sectoral balance sheet, with estimated trade and capital flows, to understand

whether there are systematic winners and losers in currency markets; the links with persistent trade imbalances; the relationship between risk, reward and liquidity (volume); and the sources of funding liquidity.

The idea that some sectors make systematic losses in currency markets is discussed by practitioners and can be found in the literature:

I guess, you have got these ever-present inefficiencies in the currency market which still allow currency managers to make money and, which are probably the same ones you're familiar with, like forced sellers, people who are importing goods, tourists, corporate treasurers, pension funds, those sorts of things... ahm... so even though the number of speculators in the currency market has increased, you've still got these inefficiencies that allow profits to be made.

2012 interview with UK FX manager SPACEMAN

The currency market 'does not require full rationality of all investors... (if) at least some investors are slow in responding to changes in the interest differential. It may be that these investors need some time to think about trades before executing them, or that they simply cannot respond quickly to recent information. These investors might also be called "central banks".

(Froot and Thaler, 1990, p. 188)

Most households, and many governments, carry out only a small proportion of their transactions in foreign currency. Neither do households have unlimited access to liquidity: 'in contrast to the efficient markets theory, real-world arbitrage is risky and therefore limited' (Schleifer, 2000, p. 13). Rather, the foreign exchange market is dominated by trade in real goods and financial assets: importers, exporters, portfolio investment and speculators.

Conclusions

The core theme of this Chapter has been that liquidity, speculation and market efficiency are closely interwoven concepts. In finance theories the assumption that speculators can borrow, or invest, at the risk free rate is a common theme: there are no limits to arbitrage. Yet the evidence from currency markets, the most liquid markets of them all, is that the market is not efficient. Several theories address this counterfactual, with explanations including risk premia for smaller currencies; momentum in currency markets with overshooting; strong currencies due to productivity and trade surpluses; and speculative dynamics where inflation targeting leads to capital inflows, leading to more inflation and a cycle of boom and bust. These explanations for the carry trade are examined in more detail in **Chapter Six**. The idea that foreign exchange profits and losses are systematic, not only from the perspective of debtor and creditor countries but also within sectors such as exporters and central banks, is estimated using an empirical method. Before that, **Chapter Five** discusses issues with the regulatory data in unravelling the carry trade.

This Chapter outlined an Economics 101 model where four sectors (businesses, households, government and the external sector) reach a natural equilibrium. This model is used to assess the effectiveness of fiscal and monetary policies when assumptions such as equilibrium and homogeneous responses to monetary policy are relaxed. In the inflation-targeting model used at the Bank of England, UIP was assumed despite empirical evidence that long-term profits could be made in currency markets. In estimating the exchange rate the model only considers one balance sheet item: the current account.

The use of a single monetary policy instrument, the interest rate, to manage domestic inflation is therefore questionable: there are fiscal and regulatory policies that can be finely tuned to address problems where interest rate policy might have contradictory effects, such as simultaneous under-investment by businesses and over-indebted households. A proposal to use monetary policy to target the exchange rate, and fiscal and regulatory policies to manage the domestic economy, is outlined as an alternative.

This basic framework of stocks and flows in Economics 101 presented here is extended in later chapters. A more fully described accounting framework is inherently pluralistic and messy: decisions on which are the relevant stocks and flows will vary depending on institutional arrangements, the existing composition of the balance sheet, and behavioural differences. The possibility that theory will influence behaviour, such as changes to financial leverage after the Modigliani-Miller theorem was published, suggests that financial behaviour will change over time.

This Chapter began by discussing a wide range of phenomena that are difficult to explain in an equilibrium model, as justification for a more fully described accounting approach. **Chapter Seven** and **Chapter Eight** apply this accounting framework to gain insights into the carry trade and the Washington Consensus policies already described in **Chapter Two**. **Chapter Nine** concludes by suggesting a new set of regulatory policies.

CHAPTER 4: A new paradigm?

Introduction

Chapter Three outlined an accounting approach to economics that discards many of the simplifying assumptions of New Consensus Macroeconomics (NCM): this approach is adopted in subsequent Chapters of this thesis. An accounting framework was chosen because it allows for abduction: there can be fewer and more flexible priors (assumptions) than under NCM, resulting in multiple explanations for the same phenomena. An abductive approach therefore allows the researcher two things: i) to draw on, and develop, personal experience, networks and knowledge and ii) to use this knowledge and experience to discard unlikely explanations. By allowing for ‘competing research programmes’ (Lakatos, 1978, p. 69), an accounting approach embraces theoretical pluralism: progress is by both refutations and verifications which ‘provide the contact points with reality’ (Lakatos, 1978, p. 52) The approach is therefore exploratory, rather than positive or normative.

There are still rigidities and assumptions with an accounting approach, beginning with the simple premise that ‘there are no “black holes” – every flow comes from somewhere and goes somewhere. But this is easier said than done’ (Godley, 1996, p. 7). Sectors of the economy are represented by columns (assets and liabilities) and transactions are represented by rows. These rigidities share a variety of ontological and epistemological priors. In particular, the inclusion of institutions and the categorisation of economic sectors as households, firms, governments and banks and the idea of money as a circulation, have their roots in the writings of Aristotle, Keynes, Marx and Schumpeter. These roots are discussed in more detail in this Chapter. This thesis leans towards Post-Keynesian representations of stocks and flows, because of the importance they attach to retained profits and wealth accumulation. The work of Kalecki, in particular, provides a powerful framework to explain the phenomena of leverage, tax avoidance and offshore banking described in **Chapters Two** and **Three**.

The approach taken draws heavily on National Accounting data, particularly in the empirical work of **Chapters Six** and **Eight**. Embedded within the structure of these

accounts are both assumptions about institutions and power, and an implicit market mechanism, where international stocks and flows are reconciled via 'price clearing' in the foreign exchange markets (see **Equation 5.4**). This market mechanism is normally unstated, but it is made explicit and discussed in **Chapter Five**. The Post-Keynesian accounting approach is then adapted to explore the distributional implications of changes in foreign exchange prices (**Chapters Six and Eight**).

Lastly, Post-Keynesianism was chosen, rather than New Consensus Macroeconomics, Institutionalist or other heterodox approaches (Jo, 2013), because the 'heuristic power' (Lakatos, 1978, p. 98) of Post-Keynesianism became more apparent after the GFC. According to Bezemer these 'accounting (or flow-of-funds) models of the economy turned out to be the shared mindset of a large subset of those analysts who worried about a credit-cum-debt crisis followed by recession, before the policy and academic establishment did' (Bezemer 2010, p. 676) and several of these economists left evidence to support their claims they had seen the crisis coming in their published research, blogs and commentary. Bezemer suggests the Post-Keynesian accounting approach 'shared by Godley, Baker, Hudson, Keen and others seems to have been particularly predictively successful, and also the theoretically most developed' (Bezemer 2010, p. 679). This is not to say that these other approaches are not useful, but that their insights can be accommodated. For example, the importance of the institutional arrangements for central banks is modelled in **Chapter Eight**.

Post-Keynesianism is part of a heterodox community that includes 'Austrian economics, feminist economics, Institutional-evolutionary economics, Marxian-radical economics, Post-Keynesian and Sraffian economics, and social economics' (Jo, 2013, p. 2). Since the Heterodox Newsletter has about 5,000 subscribers, a cynic might expect a few correct predictions of the GFC among such a diverse group. Bezemer highlights the heuristic power of this approach based on four selection criteria: their predictions had a theoretical basis; they predicted and explained how the GFC would transmit from a real-estate to wider recession; there is a public record of their claims; and they were broadly accurate in predicting the timing of the crisis.

This Chapter summarises the background and key features of the Post-Keynesian approach; it examines the model and predictions made by Godley in particular; it outlines the software models used in later Chapters of this thesis; and it sums up with a discussion of the issues with the approach.

Background to the Post-Keynesian accounting approach

Bezemer suggests that the Scottish economist Henry Dunning Macleod (1821-1902) gave one of the earliest representation of 'the accounting approach' (Bezemer 2010, p.679) and Kinsella suggests a 'pre- precursor' to the accounting approach can be found in Petty's *'Verbum Sapienti'* (Word to the Wise) written in 1664 and published in 1691 (Kinsella, 2011, p. 2).

References to the circular flow of money can be traced to Aristotle's 'Politics' (384-322BC) such that Marx 'footnotes Aristotle's Politics, quoting extensively... and giving his interpretation of the text' (Pack 2010, p.127). Aristotle thought that three uses of money arose simultaneously - trade in goods and services, speculation, and usury - and these three uses arise as a single developmental stage.

- i) Natural chrêmatistikê refers to the use of money to separate the sale and purchase of commodities in time and place
- ii) Unnatural chrêmatistikê refers to the use of money to speculate on commodities where 'the aim is to get money by buying goods and selling them for a greater sum' (Meikle 1994, p. 27)
- iii) Obolostatikê refers to lending money at interest... or 'the breeding of money from money' which Aristotle 'says is the most hated sort and with reason' (Meikle 1994, p. 27)

Marx describes these as the circuits C-M-C (commodity-money-commodity), M-C-M (money-commodity-money) and M-M (money-money). For Marx, the creation of credit was a solution to the puzzle that profit could be made by capitalists: 'paradoxical as it may appear at first sight, it is the capitalist himself that throws the money into circulation which serves for the realisation of the surplus-value incorporated in the commodities' (Marx, 1885, p. 204). Marx thought that a growing circulation was an essential feature

of a capitalist economy: 'the circulation of money as capital is, on the contrary, an end in itself, for the expansion of value takes place only within this constantly renewed movement. The circulation of capital has therefore no limits' (Marx 1867, p. 105).

Keynes thought that speculation would lead to 'wide fluctuations in liquidity preference' (Keynes, 1936, p. 111). Without speculation, demand for money would be balanced by interest rates: a fall would increase the 'transactions-motive' (bridging sales and receipts, or income and spending) and a rise would increase the 'precautionary-motive' (holding cash to pay for a certain proportion of future spending). Keynes reserved his greatest criticism for usury, which he described as 'the destruction of the inducement to invest... the outstanding evil, the prime impediment to the growth of wealth, in the ancient and medieval worlds. And naturally so... it was inevitable that the rate of interest, unless it was curbed by every instrument at the disposal of society, would rise too high to permit of an adequate inducement to invest' (Keynes, 1936, p. 215). Marx agreed: 'there is, on this earth, no greater enemy of man (after the devil) than a gripe-money, and usurer... usury is a great huge monster, like a werewolf, who lays waste all, more than any Cacus, Gerion or Antus' (Marx 1867, p. 422).

These two ideas, the circulatory nature of capital and the different uses of money, were further developed by Schumpeter and Kalecki. By rejecting analysis at 'the level of the individual and his or her marginal calculations of costs and benefits' (Bezemer, 2010, p. 680) they were rejecting the Marginal Revolution, with the circular view increasingly seen as a heterodox approach.

Schumpeter emphasised a business cycle approach with different uses of money: 'debt arising from credit created to finance the innovations and business expansions that increase productivity is "productive" debt. But credit created in the secondary wave for consumers, speculative businesses and financial speculators, results in a build up of "unproductive" debt, which is primarily induced by "easy" money and results in problems of "over indebtedness"... in extreme cases, great speculative manias develop

in the financial markets, such as occurred in 1928-29' (Leathers and Raines 2004, p. 672).

For Minsky, too, the role of speculative finance needed more emphasis: 'the conclusion to our argument is that the missing step in the standard Keynesian theory was the explicit consideration of capitalist finance within a cyclical and speculative context' (Minsky, 1975, p. 129). Minsky thought that Keynes did not emphasise this because the post-war period was one of robust finance, with a banking system 'heavily weighted with government debt' and a unique period for the lack of speculative finance.

Kalecki famously said that 'I have found out what economics is; it is the science of confusing stocks with flows' (Robinson, 1982, p. 295). Kalecki developed his profit equation using an accounting framework (**Equation 4.1**). This contribution was followed by Backus, Brainard, Smith and Tobin, who also use an accounting framework with stocks and flows for each sector. More recently, this fully-articulated approach has been extended by Godley and Lavoie to simulate portfolio choices, liquidity preferences, inventories, capital gains, inflation, inside/outside money, trade imbalances and growth (Godley and Lavoie, 2007). For a more detailed account of the broader, Post-Keynesian tradition, see (King, 2003, 2012; Lavoie, 2004, 2009).

Key Features

The first key feature is that 'there cannot be any "black holes". All flows must have an origin and a destination. All budget and portfolio adding-up constraints must be respected. This holds for both behavioural relations and for the actual values of the variables' (Lavoie, 2009, p. 74). The accounting constraints provide some rigidity to the models, but at the same time the model equations rapidly become complex when details are added, because the relationship between stocks and flows changes over time, and because they vary from context to context⁷:

⁷⁷ A solution to this is to calibrate each model to a specific economy, and to ignore the lesser stocks and flows. As a consequence of different balance sheets and flows, these economic models are necessarily pluralistic, time-dependent and context-specific.

We then come to *stocks and flows*. In the new environment, stocks have come to dominate economic dynamics, in particular the large stocks of assets and, above all, debt. Stocks build up above trend during financial booms, as credit and asset prices grow beyond sustainable levels and generate stubborn overhangs once the boom turns to bust. Stocks raise serious policy challenges.

(Borio, 2012, p. 2)

Second, there is less emphasis placed on equilibrium. This might be considered a long-run condition but it might never be reached because of the ever-changing nature of the stocks and flows. There is no recourse to the magic of market clearing via the interest rate: the 'theoretical perspective of the optimists, whether they realise it or not, sees all agents, including the government, as participants in a gigantic market process in which commodities, labor (sic) and financial assets are supplied and demanded. If this market works properly, prices (e.g. for labor and commodities) get established that clear all markets' (Godley, 1999, p. 1).

Third is the Kaleckian insight that retained profits play a key role, and in turn are affected by other balances such as the government deficit and changes in savings and investment. If the assumption that savings must equal investments is relaxed, and **Equation 3.6** is re-arranged, firms' undistributed profits are equal to investment by firms, plus government deficit, less household saving:

$$\text{Equation 4.1: } FU = I_f + DEF - S_h$$

Where FU = undistributed profits, DEF = government deficit I_f = investment by firms, S_h = household saving (adapted from Kalecki, 1971, p. 82-83)

As discussed in **Chapters One** and **Three**, growth in retained earnings presents a serious empirical challenge to the idea of a tendency towards equilibrium, as do growing imbalances in national accounts; and growth in reserve assets, loans, bonds

and equities that has decoupled from GDP. Instead, the growth of undistributed profit is determined by the interactions between firms, households and government.

Fourth, conventional thinking that the government must run a balanced budget is relaxed. The conventional idea is that the government and the private sector compete for private saving, which implies that crowding-out effects will reduce consumption 'because taxes must rise to pay for higher government spending' (Harrison et al., 2005, p. 137). These 'crowding out effects are not just financial market effects, there might actually be some diversion of productivity, of effort, towards the public sector if a pool of talent is diverted away from private enterprise' (Select Committee on Economic Affairs, 2004, p. 215).

A key rebuttal to the crowding out idea came from the accounting model developed by Backus, Brainard, Smith and Tobin, whose stocks and flows are based on national accounting sectors: government, non-financial firms, financial intermediaries and households (Backus et al. 1980, p. 264 Table 1). The authors questioned the idea that a government deficit is always problematic: 'increases in the quantity of government debt may decrease rather than increase the required rate of return on capital. There may be "crowding in" rather than "crowding out"' (Backus et al., 1980, p. 292). When there is a trade deficit ($M-X>0$) a twin deficit might be part of the solution to inadequate private investment. Rearranging **Equation 3.2**, when there is a trade deficit ($M-X>0$) and private sector investment is weak ($S<I$) then a twin deficit with government investment is not only desirable but necessary:

Equation 4.2: $(M - X) = (G - T) + (I - S)$

For Godley and Lavoie, the twin deficit situation 'has sometimes been interpreted to imply that government deficits *generate* trade deficits. No such causality is implied here. On the contrary, we mostly emphasise causation running in the opposite direction. With our experiments, trade deficits cause government deficits' (Godley and Lavoie, 2007, p. 178). With central bank support 'it is difficult to see how the authorities could "exhaust their stocks of domestic credit assets": they could simply

issue more bonds... a movement of speculative funds... will require interest rate or exchange rate changes' (Fetherston and Godley, 1978, p. 49)⁸.

Figures 4.1 and 4.2 illustrate the causality from trade deficits to government deficits. Attempts to run a balanced or surplus government balance in the UK and UK (which peaked around 2000) showed little impact on the trade deficit. In Greece, the trade deficit grew after 1990 despite lower government spending:

⁸ This debate has similarities between the old Currency versus Banking School debates, where 'the latter [the Banking School] undoubtedly held the field. The quantity theory of money was discredited, even in the Anglo-Saxon countries' (Wicksell, 1898, vii). Rather 'the total circulation is like a balloon: when squeezed at one end, it expands at the other. More generally, the Banking School questioned the efficacy of base control in a financial system that could generate an endless supply of money substitutes' (Humphrey, 1988, p. 7).

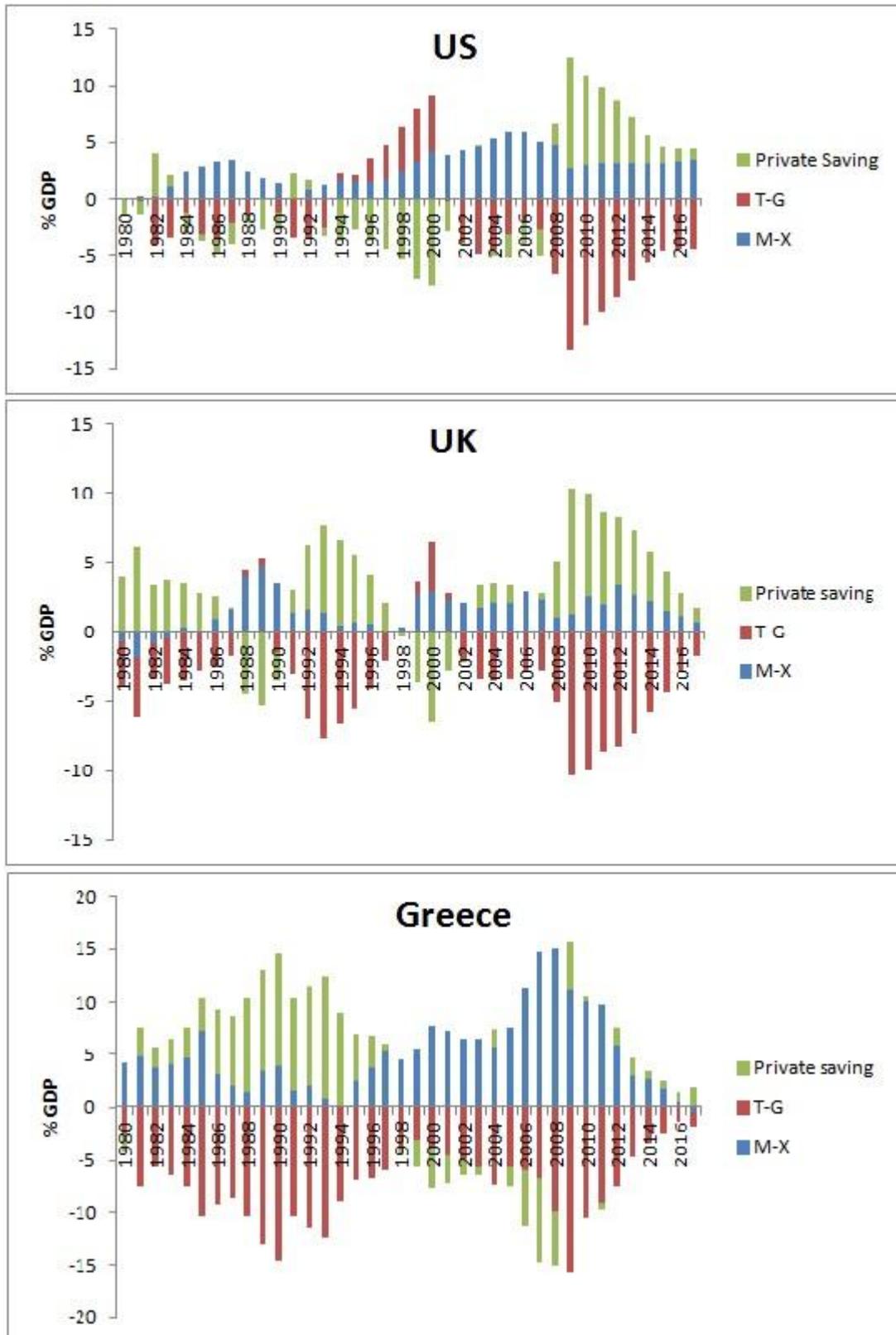


Figure 4.1. *Balanced budgets. WEO database, all figures expressed as a percentage of GDP. Results after 2011 are WEO estimates. US government deficit prior to 2000 estimated from the change in general government net debt.*

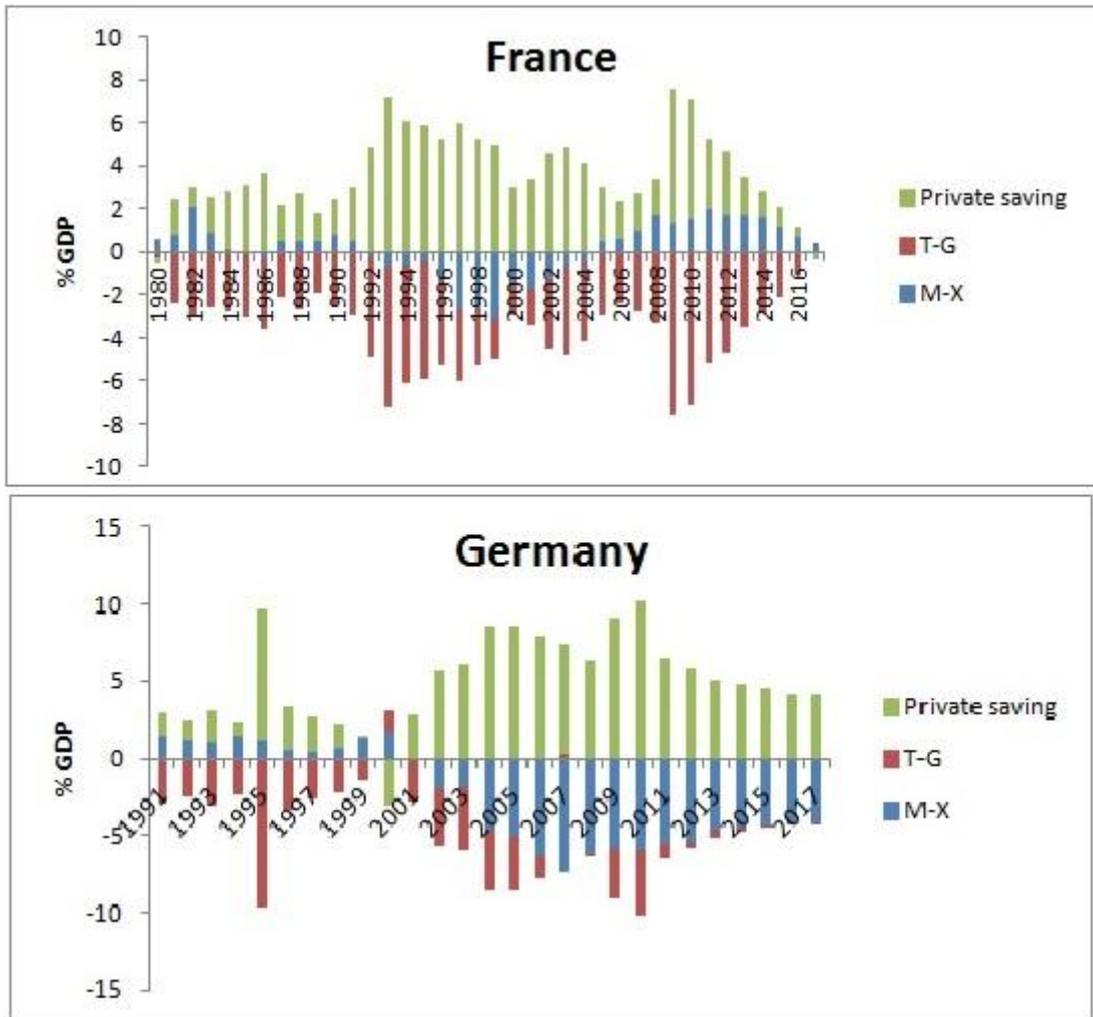


Figure 4.2. Fiscal deficits. WEO database, all figures expressed as a percentage of GDP. Results after 2011 are WEO estimates.

In contrast, **Figure 4.2** shows that France's long-running government deficit, and Germany's high government deficit after German reunification, have been matched by higher private saving, not by a worsening trade position. The data also show that private savings and investment can be out of equilibrium for long periods.

Fifth, in a fully described model, each sector has behavioural equations that show the relationships between stocks and flows. There is no 'need nor no room for the rational expectations hypothesis. Still, agents in our models are rational: they display a kind of *procedural rationality*' (Godley and Lavoie, 2007, p. 16). In the equations, the main constraints on households and businesses are solvency and liquidity, by which they set

budget rules. They adjust these ex-post according to how their budget rules perform in an uncertain world. This 'fundamental uncertainty dominates thinking about the future, and so a rough type of expectation formation - inert or delayed expectation formation - is all that is required' (Kinsella, 2011, p. 11). There is no need to reduce economic behaviour to individual agents; rather, the models focus on institutions, wages, taxes, asset prices, interest rates, inflation, unemployment, and so on.

Sixth, money is never neutral. This is evident from the 'presence of both wealth-constrained and liquidity-constrained agents... a fact of considerable economic significance' (Backus et al., 1980, p. 260). The non-neutrality of money will be explored in later chapters.

Seventh, the money supply is not determined exogenously by the central bank and interest rate policy, but endogenously by the private sector (and, in some cases, by government credit creation). Moore showed this empirically, for the US, where 'lagged changes in money wages provide a reasonably good explanation for movements in the high-powered money base, suggesting accommodative behaviour on the part of the Fed' (Moore, 1979, p. 64). **Chapter Six** will investigate whether international liquidity is endogenously driven.

Eighth, investment decisions and risks are multi-faceted because of legal and institutional differences: the interest rate and investment gains vary depending on the country, sector and type of financial asset. During crises, there is a bankruptcy pecking order that generally favours the banking sector. Equity holders come off worst, because they tend to come last in bankruptcy proceedings and their capital is not guaranteed: bond-holders come before equity, and bank loans are generally secured before bonds. Legally, derivatives are prioritised earlier during bankruptcy because stress will lead to a collateral call against these short-dated instruments (for a detailed discussion of bankruptcy privilege, see (Bolton and Oehmke, 2014)). These arrangements vary according to history and context, and can be altered by governments.

In summary, the Post-Keynesian accounting tradition provides a flexible framework with the possibility of modelling differences in stocks, flows, institutions, behaviour,

context and history. The challenge, perhaps, is not so much to model a perfect economy but to understand how diverse economies co-exist: 'it is an outstanding characteristic of the economic system in which we live that, whilst it is subject to severe fluctuations in respect of output and employment, it is not violently unstable. Indeed, it seems capable of remaining in a chronic condition of subnormal activity for a considerable period without any marked tendency either towards recovery or towards complete collapse' (Keynes 1936, p. 157).

Godley's model

Predictions made by Wynne Godley have been widely praised (Bezemer, 2010, p. 677; Macedo e Silva and Dos Santos, 2008, p. 24; Michl, 2010, p. 28). Godley writes that 'my debt to Tobin is enormous. I could not possibly have made this model without his work, particularly on asset choice' (Godley 1996, p. 3). The key features include an endogenous money stock 'as volatile as Tinkerbelle' (p. 1); 'no black holes' (p. 7); 'investment preponderantly financed out of undistributed profits' (p. 8); 'decisions taken under uncertainty' (p. 2); 'mistaken expectations' (p. 18) and 'during the recovery period – and helping to generate the recovery - the government must be held to be running a deficit and therefore shelling out financial assets which eventually restore the depleted wealth stock' (p. 23). 'Banks respond passively to the needs of businesses for loans and to the asset allocation activities of households' (p. 20) meaning that changes in stocks and flows largely occur as a consequence of the replacement of fixed capital; and changes to key variables such as wages and prices.

In simulating the path of the US economy, a stripped down version of this model was used at the Levy Institute alongside a world model that estimated demand for imports and exports. The wide disparities in the projections depended on the level of personal indebtedness and level of the stock market (Godley, 1999, p. 9) which emphasise that this is largely an exercise in national accounting:

Current growth is associated with seven unsustainable processes in the United States: (1) the fall in private saving into ever deeper negative territory, (2) the rise in the flow of net lending to the private sector, (3) the rise in the growth rate of the real money stock, (4) the rise in asset prices at a rate that far exceeds the growth of profits (or of

GDP), (5) the rise in the budget surplus, (6) the rise in the current account deficit, (7) the increase in the United States's net foreign indebtedness relative to GDP

(Godley, 1999, p. 2).

As illustrated by the three balances in **Figures 4.1** and **4.2**, it is the sustainability of trends in the national accounts that matters. US fiscal policy 'since 1992 has been far more restrictive than during any seven year period in the last 40 years' (Godley, 1999, p. 2) due to the Clinton surpluses. Looking at US private saving in detail, they realised the business sector was retaining profit and financing investment from internally generated funds: the growing current account deficit was 'mainly the consequence of an increasingly successful invasion of U.S. markets by foreign manufacturers and increased outsourcing of intermediate profits' (Godley, 1999, p. 3) and was leading to the growing indebtedness of the household sector.

Another second area where Godley's approach showed remarkable foresight was in his discussion of the institutional arrangements at the European Central Bank (ECB) and the budget restrictions for European countries under the Maastricht rules:

The power to issue its own money, to make drafts on its own central bank, is the main thing which defines national independence. If a country gives up or loses this power, it acquires the status of a local authority or colony. Local authorities and regions obviously cannot devalue. But they also lose the power to finance deficits through money creation while other methods of raising finance are subject to central regulation. Nor can they change interest rates... if a country or region has no power to devalue, and if it is not the beneficiary of a system of fiscal equalisation, then there is nothing to stop it suffering a process of cumulative and terminal decline leading, in the end, to emigration as the only alternative to poverty or starvation.

(Godley, 1992)

Chapter Five discusses how the ECB used its balance sheet to lower the yield on Greek government debt, a suggestion that was made by Marc Lavoie, a colleague of Godley: ‘interest yields of the securities issued by the various governments of the Eurozone are likely to diverge unless the ECB accepts to depart itself from the securities for which there is a high net demand on private markets and accepts to purchase the securities for which there is a relative lack of demand on private markets’ (Lavoie, 2011, p. 22). Similar advice came from the Levy Economics Institute: ‘the immediate problem could be resolved if the ECB announced that it was ready and willing to purchase all outstanding Greek bonds at market prices. The result would be a dramatic drop in yields and increases in Greek bond prices. The ECB’s message would quickly calm the financial turbulence and solve the Eurozone markets’ volatility problem until a permanent solution could be crafted’ (Papadimitriou and Randall Wray, 2012, p. 14).

Modelling support

When the post-Bretton Woods era began, there was very little software support for accounting models. Respondent ALLADIN talks about how the Bank of England would reconcile the national accounts in the 1970s:

On the grounds that everything that happened in the economy passes through the financial system and, you know, they are an exact mirror of each other... we had the whole of the financial sector, whatever their roles, we had a domestic leg, which was the domestic non-banks, insurance companies, pension funds, and what we did in a very mechanical way was, and this was my part of the job, we set out in a flow of funds matrix what the relevant flows would be in relation to whatever was happening in the economy, and there was a single Bank and Treasury forecast at that time.

2012 interview with UK central banker ALLADIN

The economists were analysing the data, not with the mainframe computers that were being rapidly deployed at investment banks, but using pen and paper:

So it all had to add up, of course it didn't add up because of flaws in statistics, and then there was the external side which was very difficult to deal with... especially post-exchange controls, you really had no idea... now the problem with all this was that we had to do this great matrix... we didn't have a program to make it hang up, and I remember spending whole Saturdays in this flat, sitting round a table trying to make the wretched thing add up... if you made an arithmetic mistake the whole thing wouldn't work... and the unidentified numbers, for which there wasn't a box, were quite often the largest numbers in the whole thing.

2012 interview with UK central banker ALLADIN

Given the data problems, it is perhaps unsurprising that under pressure from the Bank of England's econometricians, flow-of-funds accounting was abandoned in the early 1980s. 'People stopped thinking about it... because they couldn't get the data, and because it wasn't susceptible to even moderately sophisticated econometric manipulation... and it never really came back' (ALLADIN, 2012).

Conclusions

The Post-Keynesian accounting framework offers a chance to consider what happens when markets do not clear; savings do not equal investments; profit is accumulated and tax is avoided; governments do not run balanced budgets; behaviour changes; the money supply is determined endogenously; and the legal, institutional and historical context change. In this sense, it offers a flexible, pluralistic framework. The greater availability of software tools has enabled research that was time-consuming and difficult forty years ago.

The main insights from this approach come from relaxing core assumptions, using data from the national accounts to calibrate, and using an accounting framework to analyse trends. Context-specific simulations, because the range of alternative scenarios for government spending and private saving vary, give imprecise predictions. The equations in these models rapidly become complex, which also suggests a partial

approach. In other words, this is a developing field of research with a wide range of empirical puzzles and changes in financial behaviour to model: leverage and the decoupling of loans, bonds and equities from World GDP; speculation; privatisation; country specialisation; currency unions; profit accumulation and tax avoidance; the worldwide decline in interest rates and so on.

There are difficulties with the Godley model for an assessment of changes in financial behaviour because 'banks respond passively': asset allocation decisions are made by households and the financial and capital assets of the foreign sector are not part of the asset allocation decision. These assumptions are at odds with the role of banks in the GFC and the rise of professional asset managers discussed in **Chapter One**; they underplay the role of speculative capital flows in financial crises; and they could be better developed to understand how international liquidity is provided. Godley also concedes that 'the model has only a limited application because it takes so much as exogenous, for instance, interest rates, exchange rates, asset prices, world commodity prices, the flow of net lending, and the rate of wage inflation' (Godley, 1999, p. 14).

However, the framework is useful. **Chapters Seven and Eight** propose a simplified set of behavioural equations to understand international liquidity, speculation in the carry trade, and other key features of financialisation in developed economies. The Post-Keynesian and Minskian ideas are retained. International markets do not clear but trade imbalances develop. Savings do not equal investments. Financial behaviours changes, with the central bank stepping in during crises. Profit, including capital gains, is accumulated offshore and is spent by the financial sector before it is earned by selling or moving assets off-balance sheet. Governments do not run balanced budgets, but step in to support households and businesses when they are stressed. The international money supply is determined endogenously, and the behaviour of institutions (in particular, banks and central banks) alter the characteristics of the model.

In particular, the challenge is to explain how low and high interest rate economies emerge, as these underpin speculative profits from the carry trade.

CHAPTER 5: Reporting foreign exchange risk in the national accounts

Introduction

This chapter discusses how the System of National Accounts (SNA) and Balance of Payments (BOP) could be improved to better understand foreign exchange markets and the carry trade. The chapter describes the design issues that need to be overcome to fully integrate the SNA and BOP and publish an integrated, public ledger. Better integration would overcome reporting discrepancies between stocks and flows: stocks are reported net, flows are reported gross, stocks are valued at end-period exchange rates and flows are valued at transaction date exchange rates. There are also data gaps and inconsistencies: there is limited reporting of stocks such as property, land, labour and environmental resources; the accounts are obfuscated by derivatives and financial innovation; legal entities are hidden in complex ownership structures and there is no confirmation of balance sheet positions with the foreign sector. Instead, the SNA and International Investment Position (IIP) rely heavily on market valuations at year end using balancing transactions to reconcile the current, capital and financial account.

Foreign exchange profits and losses would be better revealed via an integrated transaction ledger, with the stocks reported gross, reconciled with the flows and confirmed with national accounts in the foreign sector: a form of trade confirmation that would reveal gaps and discrepancies between accounts from different countries. An idealised design could be adapted from database technologies where a 'two-phase commit' gives an indication of the quality of the data. The usability of national accounts could be further improved by extending data mappings to show how account categories in one country or period match those from another country or period. In the UK, historical comparisons are more difficult because 'after the conversion to a new accounting standard (ESA95) for the UK financial and national accounts... (requiring) a revision of historical financial and capital accounts data... this revision was completed only as far back as 1987' (Bjork and Offer, 2013). While historical time series can always be improved, better international reconciliation becomes possible with the introduction of the Product Identifier (PI) and Legal Entity Identifier (LEI).

Integration of the SNA and BOP would make it easier for researchers to validate and extend research. Data mappings would allow previous research findings to be validated using new countries and time periods, and make it easier for new theories and models to be compared with old theories. In particular, this chapter argues that exposing foreign exchange risks would allow greater scrutiny of GDP estimates and improve research into the sustainability of the external position and trade imbalances.

Quality, timeliness and coverage

Economists and regulatory bodies report on various issues with the flow of fund data. For Europe, they are not available before 2002 (Duc, 2009, p. 5) and 'despite the deluge of macroeconomic data, reliable high frequency time series exist for a fraction of the world economies' (Kinsella 2011, p. 12). In 2009 researchers at the Bank of England reported that 'in the UK, much work needs to be done to fill the data gaps identified from the financial crisis. One issue is the development of a flow of funds model for the UK... at present the data which are available are not sufficiently granular nor of sufficiently high quality' (Murphy and Westwood 2010, p. 23). A flow of funds model reports on sectors that funds flow from, and to, across the whole economy, such that change in the balance sheet can be created from the flow of funds and vice versa.

After the GFC, much of the UK data were judged to be 'poor quality' with 'six significant asset classes for which (there are not) unique data on sectoral holdings, of which quoted and unquoted equity and short and long-term debt are the most important' (Barwell and Burrows, 2011, p. 7). At the Bank of Japan, 'new financial markets and instruments' have created problems with data quality (Konno 2010, p. 524) and the IMF have called for improvements keep up with financial innovation (structured credit and credit risk products) and to better monitor the 'interconnectedness of systemically important financial institutions'. The top three data issues identified by the IMF were 'aggregate leverage and maturity mismatches... the financial linkages of systemically important global financial institutions and... cross-border activities of nonbank financial institutions' (IMF Staff, 2009, p. 11).

Understanding the flow of funds is obfuscated by active trading in secondary markets that are ‘well-organised... to facilitate the buying and selling of many kinds of existing fixed assets, notably automobiles, ships, aircraft, dwellings and other structures’ (European Commission et al 2009, p. 199). Other problems include capital assets owned by non-residents being ‘deemed, by convention, to be owned by resident units’ (European Commission et al 2009, p. 201) despite the fact that assets such as property have rental income that can flow abroad.

As a consequence of reporting differences, omissions and revaluations are an intrinsic part of the reports. **Table 5.1** shows that net errors and omissions for the UK BOP in 2010 were greater than the net amount for the reserve and capital accounts:

UK Balance of Payments (2010 Figures)	£ billions
Current account	(71.60)
Capital account	5.01
Total, current and capital account	(66.60)
Financial account	63.57
Total, current, capital and financial account	(3.03)
Net errors and omissions	13.04
Reserves and related items	(10.01)
Conversion rates: Sterling to US Dollars	0.65

Table 5.1. *Net errors and omissions in the UK BOP (2010 figures).*

With the NEO comprising a significant component of the accounts, inaccuracies can have a significant impact on other measures. For example, consider GDP measurement, which has three measures: the expenditure approach (GDP(E) - the sum of all final expenditures within an economy, plus gross capital formation, plus the trade balance); the income approach (GDP(I) - the sum of all incomes directly generated by

productive activity); and the production approach (GDP(P) - the sum of all (estimated) production activity from both goods and services):

Equation 5.1: $GDP(E) = \text{government spending} + \text{consumption} + \text{trade surplus}$

Equation 5.2: $GDP(I) = \text{compensation} + \text{gross operating surplus} + \text{mixed income} + \text{net taxes}$

Equation 5.3: $GDP(P) = \text{output} - \text{intermediate consumption} + \text{net taxes}$

Adapted from (Office for National Statistics 2012a, p. 2)

Most of these elements will be sensitive to foreign exchange risk. Under GDP(I), compensation includes pension income, the gross operating surplus includes rental income, and mixed income includes self-employment – each of which might have a foreign sector component. Under GDP(E) and GDP(P) the impact of foreign exchange is on consumption, via wealth effects, and on the balance of trade. The reliability of GDP forecasts would be easier to understand if income and expenditure were disaggregated by currency and sector, and their sensitivity to foreign exchange risk were better understood.

Benefits from publishing flow-of-funds

The suggestion for comprehensive national accounts had been put after the Great Depression:

My suggestion is that monetary theory needs to be based upon a similar analysis (to Keynes' value theory) but this time not of an income account, but of a capital account, a balance sheet. We have to concentrate on the forces which make assets and liabilities what they are.

(Hicks, 1935, p. 12)

The quadruple-entry system for the SNA that we have today was developed by a sub-committee of statistical experts working for the League of Nations, led by Stone and called the social accounting approach (Sub-committee on National Income Statistics, 1947). The economy is divided into eleven sectors plus the rest of the world: households, non-financial corporations, non-financial non-farm private enterprise, farms, the federal government, state and local government, security and realty firms, life insurance companies, other insurance carriers, the banking system and miscellaneous financial enterprises (Copeland, 1949, p. 257). This led to the United Nation proposing 'A System of National Accounts' (United Nations, 1953). The SNA shows the balance sheet on a net basis at the end of the accounting period: such as currency, deposits, accounts receivable, accounts payable, loans, equities and securities. Each stock represents both an asset and liability. Currency is a liability of the central bank and an asset of other sectors; deposits are a liability of private banks and an asset of other sectors; loans are a liability of the borrower and an asset of the lender; and so on. The quadruple-entry system for the SNA arises because 'most transactions involve two institutional units. Each transaction of this type must be recorded twice by each of the two transactors involved... the principle of quadruple entry accounting applies even when the detailed from-whom-to-whom relations between sectors are not shown in the accounts' (European Commission et al 2009, p. 21).

In parallel, the IMF developed the first 'Balance of Payments Manual' in January 1948 (International Monetary Fund, 2009, p. 3) The BOP Manual records trade flows between residents and non-residents under a 'double-entry accounting system... each transaction is recorded as consisting of two entries and the sum of the credit entries and the sum of the debit entries is the same' (International Monetary Fund, 2009, p. 9), unlike the quadruple-entry SNA system. Significantly, 'while stocks are valued at end-period exchange rates, flows are recorded on the basis of transaction rates or rates which are closer to transaction rates' (Reserve Bank of India, 2010, p. 14).

The BOP is a report of gross trade flows on the transaction date, where a 'transaction is an interaction between two institutional units that occurs by mutual agreement or

through the operation of the law and involves an exchange of value or a transfer' (International Monetary Fund, 2009, p. 29). Each flow is income for one sector and expenditure for another: wages, interest payments, dividends, rent, insurance premiums and benefits, public spending, taxes, subsidies and profits. Since the SNA is reported on a net basis, investment income ($B\pounds.r\pounds + B\$.r\$\$$) is also recorded on a net basis in the BOP. These timing and reporting differences between stocks and flows give rise to reconciliation discrepancies, not only between countries but within the datasets for the same country; these discrepancies are reported as net errors and omissions.

The sixth edition of the 'Balance of Payments and International Investment Position Manual' was designed to learn 'from the financial crises of 1994, 1997 and 1998... external debt, reserves and financial derivatives and other leveraged and complex transactions will be scrutinised in greater detail' (Wang, 2005, p. 60). The intention was to fully harmonise the SNA and BOP 'on issues such as the defining resident units (producers or consumers), valuation of transactions, the stock of external assets and liabilities, time of recording transactions and stocks, conversion procedures, coverage of international transactions in goods, services, income, capital transfers, and foreign financial assets and liabilities' (Reserve Bank of India, 2010, p. 19). This harmonisation resulted in the inclusion in BOP fifth edition of the International Investment Position (IIP), a stock position, although this is only a 'subset of the assets and liabilities in the national balance sheet' (International Monetary Fund 2009, p. 7).

Equation 5.4. shows the high level relationship between the two. The BOP, with its focus on gross trade, reports on the current account; the SNA and IIP, with their focus on net positions, report on the capital, financial and reserve accounts. In aggregate these four accounts sum to zero according to this accounting identity:

$$\text{Equation 5.4: } CAB + CAP + FAC + ORT = 0$$

Where CAB is the current account balance (goods and services, plus net income); CAP is the balance on the capital account; FAC is the balance on the financial account; and ORT are the official reserve assets.

As discussed, the current account includes imports, exports, net income on domestic investments and net income on foreign investments:

Equation 5.5: $CAB = -I + X + B\pounds.r\pounds + B\$.r\$$

Where I = imports; X = exports; $B\pounds.r\pounds$ are the net income on domestic investments; and $B\$.r\$$ are the net income on foreign investments.

The flow of funds, if it is published, reports in more detail on changes in the capital and financial accounts between reporting periods:

Equation 5.6: $CAP + FAC = +\Delta B\pounds + \Delta B\$ + \Delta CAP$

Where $\Delta B\pounds$ are net changes in holdings of domestic investments; $\Delta B\$$ are net changes in holdings of foreign investments; and ΔCAP are other capital transfers

Lastly, the official reserve assets include gold and foreign currency assets, and changes in these are also reported in the flow of funds:

Equation 5.7: $ORT = \Delta G + \Delta O\$$

Where ΔG are changes in gold and $\Delta O\$$ are changes in foreign currency assets.

Tables 5.2 and 5.3 show a high-level data mapping between the SNA and BOP, which illustrates how an integrated set of accounts would work. Note that different names are given to each section, which underlies the difficulty for researchers:

	System of National Accounts		Balance of Payments	
GDP(E)	Gross Domestic Product	1700		
=G	Government consumption	final 400		
+C	Non-government consumption	final 800		
+I	Gross capital formation	400	Goods and services	
+X	Exports of goods and services	500	Credit (export)	500
+M	Imports of goods and services	-400	Debit (import)	-400
X-M			Trade balance	100
	Current and capital account			
			Current income	
			Credit	100
			Debit	-50
<i>+B£.r£</i> <i>+B\$.r\$</i>	Net current income from abroad	50	Total	50
			Current transfers	
			Credit	300
			Debit	-150
	Net current transfers from abroad	150	Total	150
CAB			Balance on current account	300
GNI	Gross National Income	1900		
	GNI = GDP +B\$.r\$ +B£.r£			
	Gross saving (= GNI – C + G)	700		

Table 5.2: Reconciling the SNA and BOP. Adapted from (Reserve Bank of India, 2010, p. 21)

	System of National Accounts		Balance of Payments	
	Gross saving (= GNI – C + G)	700		
			Capital account	
+ΔCAP	Net capital transfers from abroad	5	Credit	5
	Net acquisition of non-produced, non-financial assets	-15	Debit	-15
	Less gross capital formation (- I)	-400	Total	-10
	Net lending (+)/net borrowing (-)	290		
			Financial Account	
			Assets	400
			Liabilities	110
+ΔCAP	Net lending (+)/net borrowing (-)	290	Total	290

Table 5.3: *Gross Saving, Capital and Financial Accounts. Adapted from (Reserve Bank of India, 2010, p. 21)*

This brief overview illustrates that integrated and disaggregated accounts are at least possible in theory, with the flow of funds showing changes in the financial and capital account from one reporting period to the next: the key issue is to report more frequently on changes in the SNA and IIP, rather than rely on year-end, market valuations. If the market fails, the government or central bank must step in to restore order: providing liquidity, resolving solvency issues, buying or selling foreign reserves, or even devaluing the currency.

At the heart of these year-end market valuations are currency markets, because values are reported after accounting for ‘any valuation changes such as that caused by changes in exchange rates and other adjustments’ (Wang, 2005, p. 60-61). Secondary markets, offshore balance sheets, derivative positions and leverage obscure the underlying valuations further.

However, there is likely to be resistance to more regular reporting. For households and businesses, if their assets are worth less than their liabilities they are technically insolvent: year-end reporting gives more room to manoeuvre under these circumstances. Governments have more leeway to run budget deficits, as discussed in **Chapter Three**. Financial firms also have a solvency constraint but *if they are not liquidity constrained* they can earn speculative profits (and avoid tax, see **Chapter One**) by leveraging and deleveraging in processes that may be invisible from studying the end-of-year national accounts.

To illustrate, consider the transactions in **Figure 5.1**. In this example, Country A earns foreign income from the export of goods; Country B runs a trade deficit and is importing plant and material to invest in production; and Country C speculates on the carry trade and uses the profits to buy goods from Country A. Following the accounting conventions described earlier i) trade in real goods is reported gross in the BOP on the transaction date and shown in BLUE ii) investment income is reported net on the transaction date and shown in BLUE and iii) the financial position is reported net in the SNA at the end of the accounting period and shown in RED.

In the example, Country B and Country C take out loans for productive investment and speculation respectively. Country B makes a long term investment in plant and machinery, so the loan is reported at the end of the accounting period and shown in RED. Country C also takes out a domestic currency loan with which it buys financial assets from Country B. In this example, the central bank in Country B is inflation targeting whereas the central bank in Country C is providing liquidity at near zero rates: Country C earns carry trade profits on the interest rate differential. These profits are swapped for real goods with Country A. Hence, Country C is funding a trade deficit entirely from the yield on its external position:

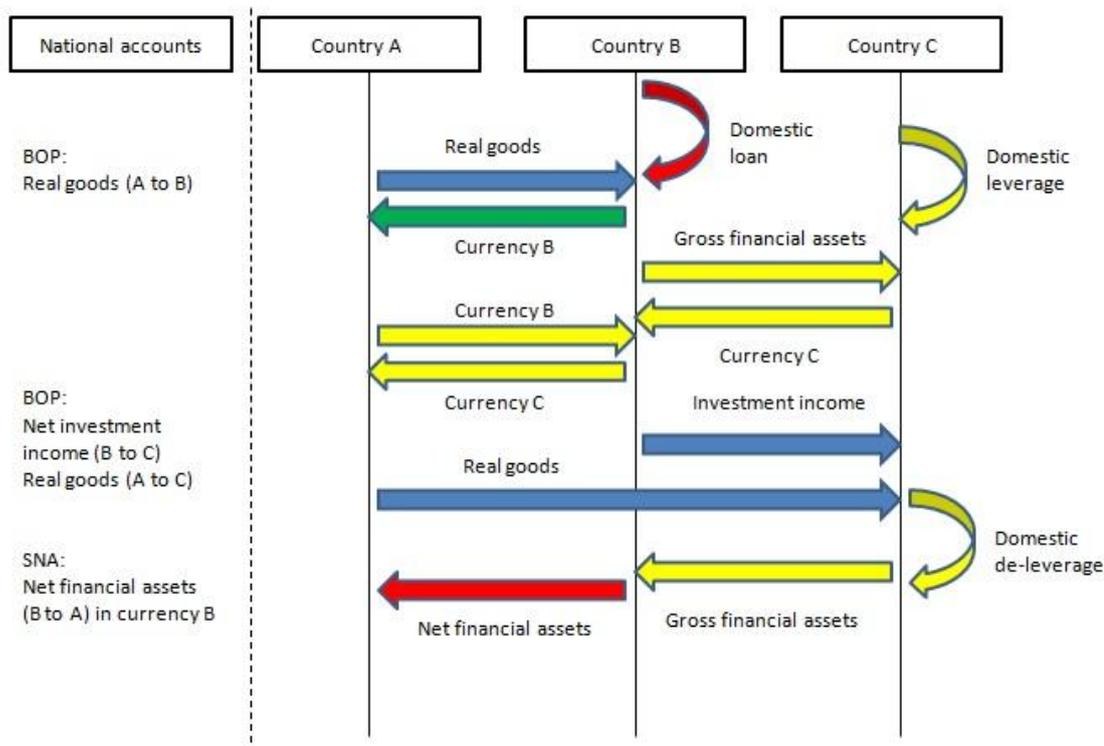


Figure 5.1. Country A is an exporter; Country B is importing plant and machinery; and Country C is speculating on financial assets. Figures show reporting of the SNA at year-end.

In this example, Country C deleverages before the end-of-year, such that the flow of funds are hidden: a researcher sees only the trade in goods (BLUE), investment income (BLUE) and the net changes in financial assets (RED). Some foreign exchange transactions can be inferred from the trade flows (GREEN) but it is difficult to see from the SNA and BOP that Country C is largely funding a trade deficit from speculation. The domestic loan for Country B is long-term and therefore visible in the SNA as a transfer Country B to Country A.

Figure 5.2 shows the same series of transactions with regular flow of funds reporting, such that the intermediate loans and flows are captured: the flow of funds report leverage by Country C; the purchase and sale of financial assets by Country C; and the subsequent deleveraging:

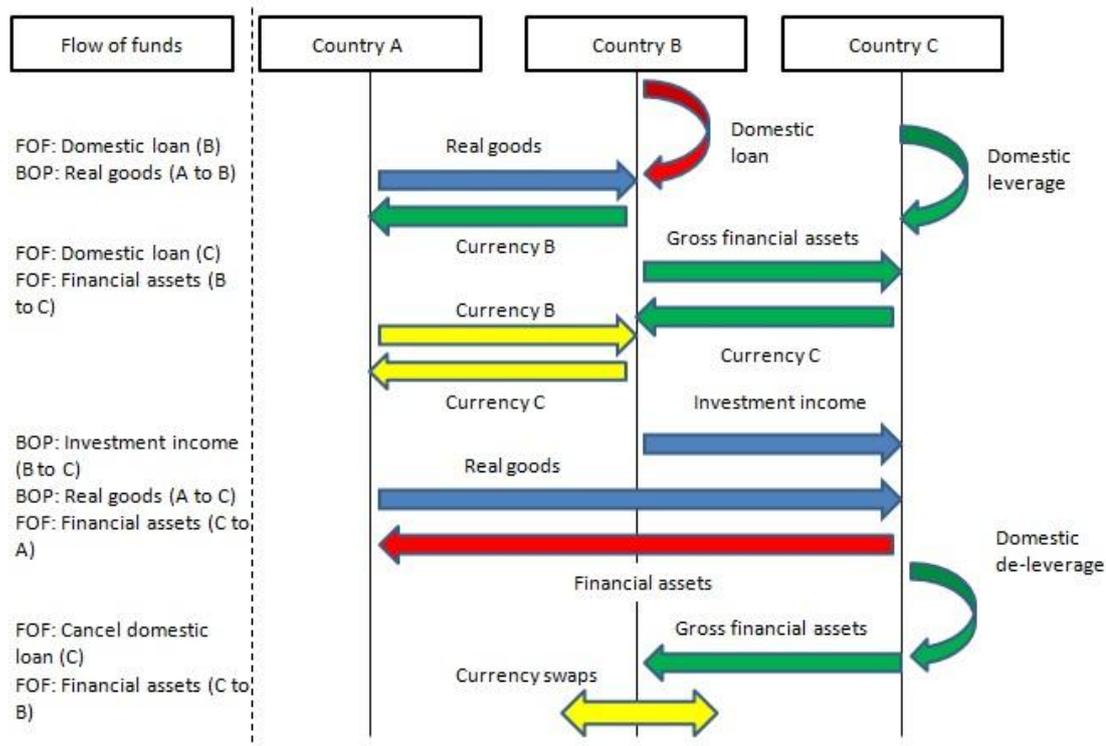


Figure 5.2. Country A is an exporter; Country B is importing plant and machinery; and Country C is speculating on financial assets. Figure shows impact of regular flow of funds reporting.

Although more of the transactions are revealed by flow-of-funds reporting, currency transactions remain hidden. However, the more frequent the flow-of-funds reporting, the more is revealed. With a daily flow-of-funds, the central bank would know the net daily currency transactions. In other words, the more frequent the reporting and netting, the greater the transparency on foreign exchange risks.

Implementation issues

In other spheres of life, such as retail, technology is employed to trace every movement of physical goods from the manufacturer, through suppliers and retailers, to the consumer. Recent proposals to introduce identifiers to trace financial activity (Ali et al., 2012) have seen the G20 agree to implement a global LEI that 'uniquely identifies parties to financial transactions' (Financial Stability Board, 2012, p. 24). In

terms of consumer goods, the PI is the equivalent of the barcode and the LEI identifies the buyer and seller. These are the first steps towards publishing integrated accounts.

However, the bundling, slicing and dicing of financial assets makes them extremely difficult to categorise with a PI. Key attributes of a financial product extend beyond the units, price and asset type: there are multiple risk and return streams such as currency, country, default, counterparty, duration and so on. Insurance products bring additional complications, with fire, theft, disaster, health and environmental risks. Payment schedules vary, as do pricing models. There are similar complications with the LEI, with recursion and cross-holdings in complex networks of control where 'nearly 4/10 of the control... (is) held, via a complicated web of ownership relations, by a group of 147 TNCs in the core, which has almost full control over itself' (Vitali et al., 2011, p. 4). Lastly, ownership of financial assets can be fractional and highly liquid, with rapid turnover in secondary markets due to financial innovation: ETFs which create pooled funds where individuals trade fractional shares; high-frequency trades where ownership changes in less than a second; derivative trades where synthetic assets and liabilities can be swapped, mature and settle before the balance sheet is published.

A design pattern from database systems might be useful. At present, with the SNA and BOP reported ex-post, it is quite possible for two countries to report completely differently on the same transaction: in database terms, this is a transaction conflict and would result in a database error (the balancing transaction and net error and omissions outlined earlier). Under a two-phase commit in database systems, there is a co-ordinator which confirms the transaction or instigates a roll-back. There are other transaction patterns, including trade confirmation after a time delay if the other party does not respond. The advantage of trade confirmation is that improves the quality of the data knowing that both parties have agreed it.

Another issue is anonymity. For the international statistics, there is no need to identify the legal entity beyond their country and sector, which could be encoded in the LEI. Private banks and payment systems could offer anonymity as part of their services to clients, in the same way that technology companies build their own protocols on top of core protocols. For technology interoperability, nodes (the equivalent of countries and

sectors) are defined in a communication protocol called TCPIP (transmission control protocol). The user is afforded anonymity with their IP address, which in turn can be hidden behind an internet firewall. Internet protocols also define the message (the products) and give an international timestamp to each message (when). An entirely localised and anonymous system is possible, provided messages are routed using the international protocol. The same principles of localisation could be applied at the national level to account for different reporting standards. In other words, translation protocols provide interoperability between regions, with anonymity and different levels of localization.

If the National Accounts were to match this level of sophistication, economists would be able to do empirical work knowing the accounts reconcile at the local, national, regional and international level. Providers (such as the Office for National Statistics) could publish data mappings that link datasets based on different underlying protocols (such as earlier version of the BOP) making it easier to validate earlier research findings, bring them up-to-date with more recent data and see the impact of improvements to the protocols on earlier empirical work.

So there are design patterns that could be used, based on the PI and LEI protocols. Anonymity is possible, allowing private banks and exchanges to aggregate trades and only report the data needed for the SNA and BOP, such as the country and sector of the counterparties. The existing SNA and BOP could be localised to show particular sector and product decompositions. The benefits to private and public researchers are clear: they simply need to ask the regulatory body for a particular presentation on the data, such as the SNA 1993 or SNA 2008. This would allow better validation of previous research, which could be updated to reveal the impact of improvements to the data and data standards on historic results.

The ability to have an integrated set of national accounts depends heavily, too, on whether regulators can compel the private sector to report more frequently on their balance sheets and their trade counterparties. This goes beyond the technical aspects of providing a public register of identifiers. As discussed, private institutions will resist regular reporting when their solvency is an issue. More significantly, international

reconciliation requires agreement on the registration of LEI and PI and the details captured. As a minimum the national accounts require the asset type, amount, price, currency, the sector and country of both legal entities, and the time of the trade. The quality of the data depends heavily on whether both parties are willing, and able, to report this data to the regulator.

Neither are national regulators incentivised to work with international regulators. As discussed in **Chapter One**, asset management and currency markets have become concentrated in key financial centres – which in turn provide work for national regulators in the UK and US. The international community might insist that only trades that are recorded in an international ledger are permissible under international law, but the recent case between Argentina and NML Capital Ltd suggests international legal agreement will be a slow process (Supreme Court of the United States, 2014). In other words, there are few incentives to reform.

TARGET: a model or a flawed implementation?

The Trans-European Automated Real-time Gross Settlement Express Transfer system, or TARGET is an interesting Case Study. TARGET is the settlement system used by European central banks, and is a platform for multiple central banks and private banks to report cross-border settlements as TARGET imbalances. The nature of these imbalances is the subject of detailed economic research, such as (Cecchetti, Mccauley, and Mcguire, 2012; H.-W. Sinn and Wollmershäuser, 2011) but, in essence, it provides a daily reconciliation of payments across the European banking system. However, there is no obligation on individual central banks to report on foreign exchange gains and losses, and the TARGET system is not ‘subject to any legal netting or set-off arrangement’ (Bank of England, 2000, p. 74). In other words, payment imbalances can grow in parallel with imbalances in the current, capital and financial account. TARGET effectively acts as a pooled fund for central bank assets and liabilities across the Eurozone. These assets and liabilities comprise Euro-denominated securities and deposits which are ‘predominantly matched by euro bills together with currency, foreign exchange and interest rate swaps’ (Bank of England, 2000, p. 72).

This large, pooled fund has since been used to stabilise the European banking system through 'outright monetary transactions (which are) fully sterilised' (European Central Bank, 2012): the ECB has been buying sovereign debt in the Eurozone periphery and selling sovereign debt in surplus countries like Germany. In other words, there has been a fundamental shift in the management of liquidity within the Eurozone. From 1998 to 2012, ECB liquidity policy was determined by the reserve requirements of national central banks, with higher demand for German bonds to back deposits in German banks. Since 2012, ECB liquidity policy has been used as a countercyclical measure to lower the borrowing rates in deficit countries.

How has this affected the balance sheets of each central bank in the TARGET system? The only way to measure this is to for national central banks to report on the country and currency composition of their assets and liabilities. The International Financial Statistics (IFS) categorise official foreign assets which are 'those external assets that are readily available to and controlled by monetary authorities for meeting balance of payments financing needs, for intervention in exchange markets to affect the currency exchange rate, and for other related purposes (such as maintaining confidence in the currency and economy, and serving as a basis for foreign borrowing)' (International Monetary Fund, 2009, p. 111). If they are held by a quasi-public body, like a Sovereign Wealth Fund, they might not be classified as foreign assets because sovereign wealth funds and national investment banks are not considered to be sufficiently liquid for monetary purposes. There is a residency concept which defines foreign assets as a claim on non-residents, but beyond that there is no reporting requirement to show the currency or country composition of the balance sheet. **Table 5.4** illustrates the IFS data categories. On the liability side are reserve deposits and domestic currency. On the asset side are foreign reserve assets, and claims on banks, non-banks, the private sector and governments:

International Financial Statistics		
Assets	Foreign assets	These are the net claims on non-residents in monetary gold, SDR holdings, foreign currency, deposits, securities (other than shares), loans, financial derivatives and other
	Claims on domestic banking institutions	These are the net claims on depository corporations
	Claims on non-bank financial institutions	As above, but for non-banks
	Claims on private sector	As above, but for the private sector
	Claims on domestic government	These are generally in the form of government securities
Liabilities	Reserve deposits	In return for selling an asset to the central bank, reserve deposits are created. Banks must hold a reserve buffer, but excess reserve deposits are available to buy assets
	Currency in circulation	Notes and coins

Table 5.4. IFS categories. Sources: (International Monetary Fund 2008, p. 224-226).

Table 5.5 shows how the Bank of England reported on TARGET and other assets and liabilities in 2000:

Bank of England Balance Sheet (as of 29 th February 2000)				Total
IFS	Assets	Foreign assets	£19.9 billion	
		Claims on domestic government	£3.9 billion	£23.8 billion
	Liabilities	Reserve deposits	£25.1 billion	£25.1 billion
Bank of England Accounts	Assets	TARGET	£13.7 billion	
		Debt securities	£3.5 billion	
		Loans and advances	£5.4 billion	
		Other	£1.3 billion	£23.9 billion
	Liabilities	TARGET	£13.6 billion	
		Deposits by central banks	£3.0 billion	
		Eurobills	£2.1 billion	
		Other	£5.2 billion	£23.9 billion

Table 5.5. Reporting by the Bank of England on TARGET balances.

In other words, there are no data on the currency and country risks: the Bank of England TARGET balances are not broken down (although we can assume these are Euro balances because they are with the Eurosystem). There is no report on exposure to individual Eurozone countries: TARGET is reported as a single, pooled fund.

Publishing the currency decomposition of central bank reserves might encourage speculation against the central bank, or even entire regional banks. On the other hand, publishing the transaction ledger would allow researchers to study, in more detail, the causal relationships between bank balance sheets, trade in goods, and trade in financial assets. **Chapter Six** discusses a dataset which shows the currency composition of central bank reserves in aggregate (as developed, developing and emerging

economies) as a method to estimate these central bank foreign exchange profits and losses. However, given the risks to financial stability if there is speculation and a shortage of foreign currency for trade settlement, it might be prudent for central banks to release historical datasets first.

Financial and capital account imbalances

For some categories of financial asset, however, there are public registers, such as US publications of foreign holders of US Treasury debt. These figures reflect trade imbalances with the US, as well as the growth of the Eurodollar banks, the accumulation of US Dollar deposits offshore, and the development of clearing houses. In September 2013, most foreign holdings of US Treasuries were in Japan then China (both at \$1.8 trillion); then the United Kingdom, Cayman Islands and Caribbean (US Department of the Treasury, 2013b). These positions are qualitatively different: in Japan, it is the Japanese Treasury and private citizens who hold US Treasuries; in China it is mainly the central bank; and in the three other centres the owners are likely to be private banks and financial institutions. A recent surge in US Treasury holdings by Belgium has been attributed to Euroclear, a securities lending business and clearing house (Mackenzie and Stafford, 2014). These examples suggest public registers can be very useful in identifying trends and new fragilities.

Extending the public register to other asset classes is essential for research into the sustainability of the external position. The literature on current account sustainability (Gourinchas and Rey, 2007; Lane and Milesi-Ferretti, 2005; Obstfeld and Rogoff, 2005) relies heavily on national accounts but, as outlined, flows are generally a snapshot and incomplete. Within the current account sustainability literature there is the idea of a tipping point beyond which the external position becomes unstable and the net yield on external liabilities exceeds the net yield on external assets:

Equation 5.8: $(Ar_A - Lr_L) < 0$

Where A = net foreign assets, L = net foreign loans, r_A = return on assets; and r_L = interest rate on loans, Adapted from (Gourinchas and Rey, 2007, p. 27)

With better flow of funds data, these tipping points could be further analysed by sector, to understand whether instability is being driven by households, businesses, government or financial firms. The data could be further disaggregated by region, to pinpoint whether financial instability is being driven by, say, private equity firms or property lending in a particular city:

Equation 5.9: $\sum_1^n (A_1 r_{A1} + A_2 r_{A2} + \dots A_n r_{An}) - \sum_1^n (L_1 r_{L1} + L_2 r_{L1} + \dots L_n r_{Ln}) < 0$

To illustrate for the US, in 2007 Gourinchas and Rey were suggesting a tipping point for the US economy when liabilities exceeded assets by 1.43. Their estimates used past returns to extrapolate future returns and assumed 'most US liabilities are in dollars, whereas a share of US assets are in foreign currency' (Gourinchas and Rey, 2007, p. 29). Since then, of course, there has been the GFC and QE by the Fed, which will have transformed the external position. However, while central banks and governments can influence the yield on domestic assets, they have fewer policy options to push up the yield on foreign assets. Should developing and emerging economies move away from inflation targeting and towards zero interest rates, the tipping point might be transformed again.

Speculation on the financial account and selling the 'lemons' (Akerlof, 1970) to non-residents are not the only strategies to avoid the tipping point: another is to run a current account surplus by growing exports. However, whether re-balancing is accompanied by financial crisis will, among other things, depend on the currency composition of the external position. As discussed in **Chapter One**, currency devaluation can be destabilising if debts are denominated in a foreign currency.

In other words, monetary sovereignty and liquidity provision may not be sufficient. The benefits of monetary sovereignty are that public assets show 'other virtues (e.g. safety) which makes them attractive in spite of their lower yield' (Hausmann and Sturzenegger, 2006, p. 4). However, a trade surplus allows a country to accumulate foreign currency reserves, which are a form of self-insurance during periods of capital flight. A third solution is to sell assets in financial markets by making the yield as

attractive as possible: the Washington Consensus solution to increase profits, cut government spending, drive down wages, open up the economy to foreign investment, and so on. The Washington Consensus is analysed in more detail in **Chapter Eight**.

International trade imbalances

As discussed in **Chapter Two**, the growth of central bank reserves, which have decoupled from World GDP growth, are dwarfed by private financial assets. In turn, trade imbalances are dwarfed by central bank reserves. **Figure 5.3** illustrates this for China: from 2000 to 2011, the official foreign assets of central banks rose from six per cent to over 14 per cent of World GDP, with China accounting for over 50 per cent of the total for emerging and developing countries. Yet only five per cent of China's official reserves can be accounted for by their current account surplus:

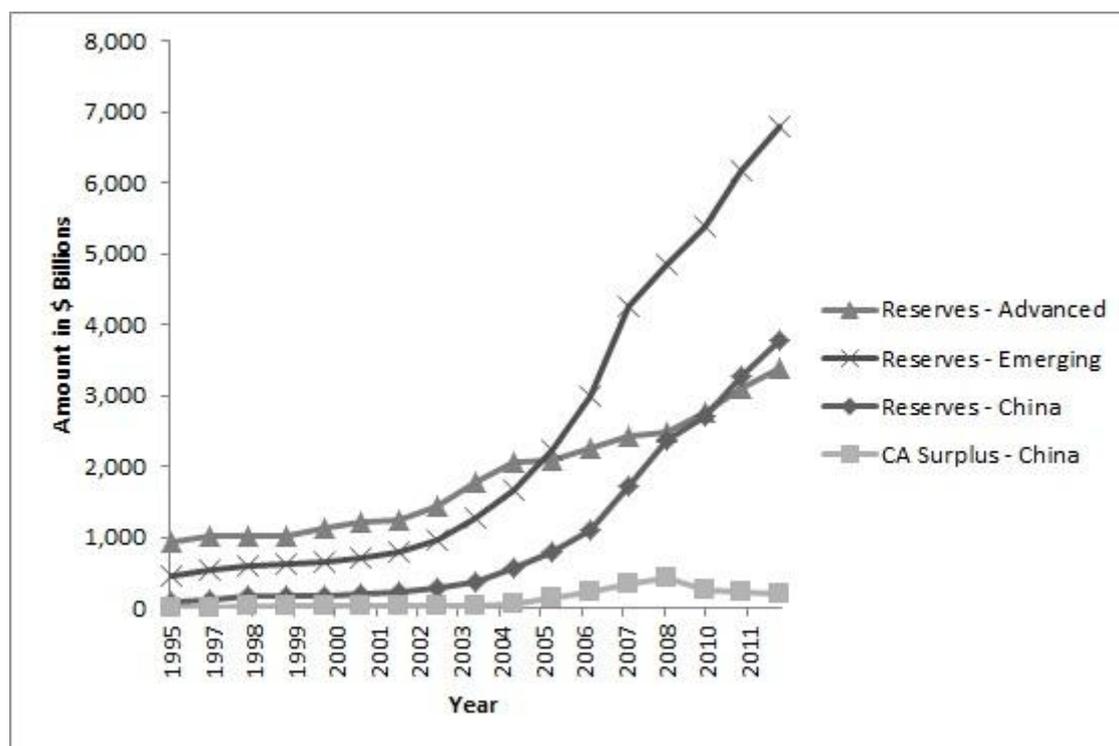


Figure 5.3. Foreign reserves and China's current account surplus. Sources: COFER, Bank of China; State Administration of FX, China; WM Reuters.

Critics argue this is because China's trade flows are incorrectly reported, with argument that they are both over-invoicing to borrow cheaply in US Dollars and invest

in renminbi (Altman, 2013) and under-invoicing to avoid trade tariffs (Ferrantino et al., 2012). The quality of this trade data and prevent tax evasion and fraud would improve if there were trade confirmation between countries.

However, from **Equation 5.4.**, the financial and capital account can also lead to imbalances if China is a net seller of financial and capital assets to the foreign sector. China's capital and financial account are increasingly accessible to foreign investors: according to speculators, the offshore market is a 'pretty reliable' measure of the onshore market:

The Chinese currency, or you know, Korea, India, Taiwan, you know, Brazil, these sorts of countries... they're liquid but they're not accessible... we use, we do access... you can't actually access the onshore market because of capital controls... I don't know if you're aware of non-deliverable forwards (NDF) ... it's essentially a US Dollar settled contract for difference that's traded over-the-counter with another party... it just depends I think how porous the capital controls are... In China it's less reliable, but still pretty reliable... but countries like, take, Brazil and Russia the NDF is as good as being exposed to the onshore.

2012 interview with UK FX manager SPACEMAN

Indeed, China saw foreign exchange turnover in renminbi grow from about 1 billion US Dollars in April 2004, to 20 billion US Dollars in April 2010 (Bank for International Settlements 2010, p. 82) and to 120 billion US Dollars by April 2013 (Bank for International Settlements, 2013, p. 13). Over the same period, the offshore market in renminbi has grown very significantly (Bourse Consult, 2012, p. 29).

Foreigners have been able to buy 'B' and 'H' equity shares in Chinese companies since 1992, and Qualified Foreign Institutional Investors can invest directly in 'A' equity shares: these holdings are estimated to be around five to six per cent of the total (Chen, Du, Li, and Ouyang, 2013, p. 661). Since the capitalisation of the Shanghai and

Shenzen stock exchanges is around 4 trillion US dollars, which accounts for a further 200 billion US Dollars.

A third element of China's growing reserve assets is the investment income on the bonds already purchased. The total return on a US benchmark bond was about 31 per cent from 2001 to 2007, where total return is the combination of capital gain and the coupons.

A fourth possibility is that the People's Bank of China made significant profits on gold reserves, with a much higher rate of return. Gold bullion, for example, returned almost 600 per cent from 2001 to 2013, when it reached 1,600 US Dollars per ounce. Although data are scarce, official gold reserves in China are less than two per cent of the total (Bloomberg News, 2013; People's Bank of China, 2012) so, according to the official figures, capital gains on gold are not significant.

Together, these estimates account for the majority of China's foreign reserves, with the exception of 300 billion US Dollars. In other words, there is a need to look beyond foreign purchases of Chinese goods, and foreign investment in Chinese financial assets:

Item (in billions USD)	2001	2007	Difference
Reserves	240	1,599	1,359
Less			
Current account surplus	-37	-353	1,043
Offshore renminbi		-120	923
Equity investments		-200	723
Less 31 per cent capital appreciation on T bills		-369	354
Less 300 per cent capital appreciation on 2 per cent gold reserves		-60	294

Table 5.6. Accounting for China's foreign reserves. Sources: Datastream, own calculations

Growth in foreign reserve assets has also been a feature at the Swiss Central Bank, in the Euro area, and in the other BRIC economies (Brazil, Russia and India). A feature of these more open economies might simply be that private investors are shunning US Dollar denominated assets, preferring to exchange their trade receipts for local currency.

Summary

The political nature of the international debate on imbalances has been attributed to both debtors and creditors as a currency war (Dooley et al., 2009; Hongbing, 2013; Levin, 2011). However, trade imbalances are dwarfed by growth in private sector financial assets and liabilities, which suggests that private, speculative capital flows are increasingly likely to create financial instability. The literature on financial crises and speculative capital was discussed in **Chapter One**.

The lessons from the ECB and TARGET system are that the management of European liquidity reserves by central banks has an impact on financial stability. ECB policies might well have created instability prior to 2012, when German deposits were backed by German (as opposed to Greek) bonds. However, for economists to understand underlying pressures within the financial and capital accounts, flow-of-funds data need to be published more frequently. By publishing the currency composition of the balance sheet, and showing which sector funds are flowing from and to, researchers have a better chance of understanding the sustainability of external positions. The principle of disaggregating regulatory data by country, currency and sector extends to GDP forecasts, where researchers could include estimates of their sensitivity to foreign exchange fluctuations. Even with regular flow-of-funds reporting on assets and liabilities, there can be unreported derivative positions such as short-term currency swaps that earn profits on the carry trade; and are visible only as investment income. However, the more frequent reporting of flow-of-funds becomes, the more transparency there will be on foreign exchange markets.

There are a number of technical and political issues to overcome. The technical issues require the international adoption of product and legal entity identifiers (PI or LEI) as a first step. The PI and the LEI enable the two of the three salient features of a public

ledger: the nature of the financial payments between different entities. Design patterns from database and internet technologies offer ways to deal with the key issues of anonymity and localization, but without a public ledger there is no record of the third salient feature: when payments occur.

At present, each country publishes their own set of national accounts, usually via the central bank or a statistical body, for collation by supranational and international bodies. The flow of data for the PI and LEI would need to be reversed: from international exchanges and ledgers, to supranational and then national accounts. This, in itself, would be seen as a threat to sovereignty. There are few, if any, incentives for the private sector to commit to regular reporting of balance sheets and trades. Households and businesses might be insolvent and unwilling to report assets and liabilities. Similarly, financial firms will prefer not to report if they can earn speculative profits from their inside information.

Yet the list of potential market failures is growing: current account imbalances, shifts in reserve management and unsustainable external positions. Better data for researchers would lead to better estimates of measures such as GDP, and more robust policy recommendations. External positions might have different tipping points at the sectoral level (households, firms, banks and governments) to the aggregate level. An estimate of the scale of the problem with the US external position, prior to the GFC, was that to balance trade with the financial account required an 'implausible depreciation of 75 per cent' in one year or 'a depreciation of 18 per cent per year' over five years (Gourinchas and Rey, 2007, p. 32).

Given the unknown risks from foreign exchange fluctuations; the risks to the reputation of major centres from fraud and market manipulation; the revenue lost to governments from tax avoidance; and the costs of the GFC; the trend to publish flow-of-funds and to improve transparency in currency markets look set to continue.

CHAPTER 6: How should we regulate the carry trade?

This Chapter investigates the carry trade among G5 currencies from the perspectives described in **Chapter Three**: was it arbitrated away by speculation; were there systematic winners and losers; was there a risk premium; and were there momentum effects with boom and bust.

Despite higher trading volumes, there is no evidence the carry trade was being arbitrated away in the period before to the GFC. The profits and losses to different sectors are estimated using a stock-flow consistent method: the results show that exporters were systematic losers before the GFC, and central banks after the GFC, suggesting the financial sector in deficit countries has been the main winner. During financial crises, G5 central banks provide a liquidity put until markets settle into a 'new normal' with different risk and return characteristics: the GFC was preceded by a period of exceptionally low volatility.

Disaggregating a simulated carry trade by currency and currency pair suggests the risks and returns are time-varying; with private banks providing global liquidity, driving the process endogenously from boom to bust, and undermining monetary policy. If non-performing loans rise with interest rates at near zero, the GFC might repeat without central bank co-ordination.

Introduction

Interbank rates have fallen globally since the Greenspan put (**Figure 6.1**). The lowest rate had fallen to below 0.5 per cent in 1996 and 0.1 per cent in 1999. The Global Financial Crisis (GFC) was preceded by a small rise in interbank rates after March 2006, with rates above 0.5 per cent at the end of that year. After the GFC and collapse of Lehman Brothers, rates reached new lows of around 33 basis points when the Swiss National Bank pegged CHF to the EUR.

These near zero rates are supposed to stimulate domestic investment and recovery. In the absence of broad capital flow management, however, they also fund a wide range of carry trade strategies, borrowing in low interest rate currencies and investing in high interest rate currencies. Funding for these strategies has relied on implicit support from the central bank under 'the Bagehot principle to lend freely: a liquidity put

(Mehrling, 2011, p. 18). The evidence suggests that profits flowed to the financial sector in deficit countries when times were good and that central banks and exporters picked up the losses when times were bad: with leveraged speculation and a weak domestic sector raising rates from near zero might exacerbate instability without better co-ordination by central banks.

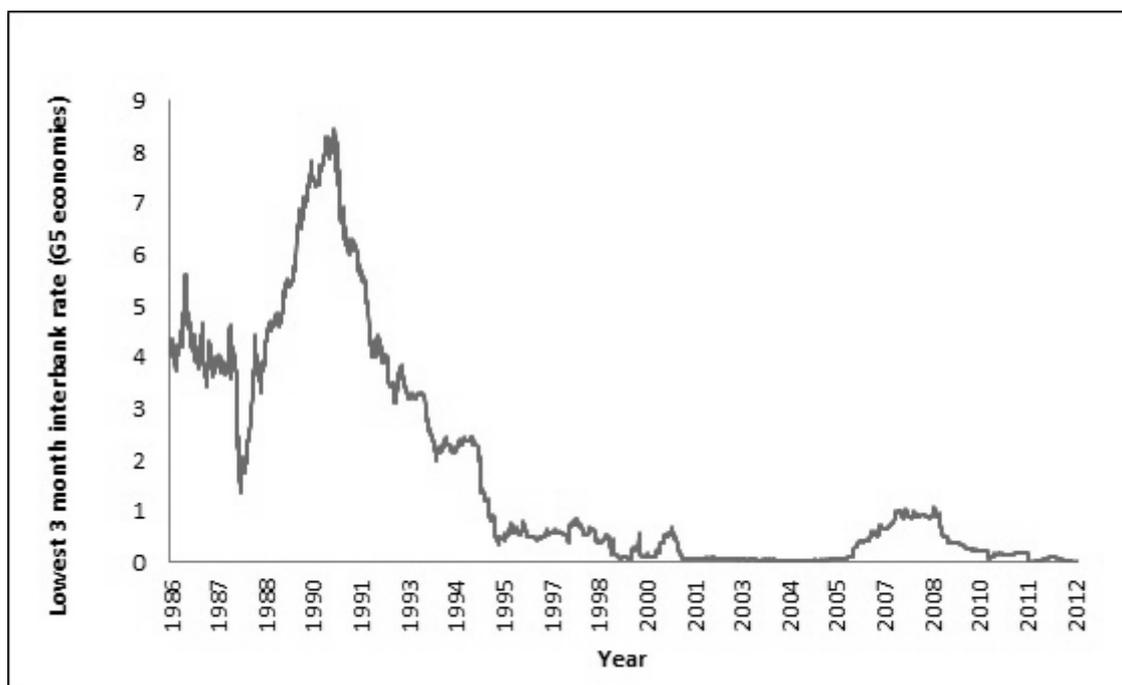


Figure 6.1. *Lowest interbank rate among the G5 economies since July 1986*

This Chapter tests this story empirically by simulating and disaggregating a carry trade from 1978 to 2013. The results suggest that the UK, Japan and the US were at the core of providing global liquidity to fund carry trades under conditions of high capital mobility.

The method proposed offers a baseline that can be used to simulate the effect of uncoordinated rate rises on the carry trade and balance sheets. Estimating the winners and losers can be improved as better regulatory data become available and the method can be extended to other carry trades such as BRIC-G5 and MINT-G5. As such, it could be a useful tool in the management of speculative capital flows.

Related literature

As discussed in **Chapter Three**, the carry trade is a persistent anomaly in financial markets. According to the literature on market efficiency it should not be possible to forecast 'returns with variables like dividend yields and interest rates' (Fama, 1991, p. 1576). The low interest rate currency is supposed to appreciate and the high interest rate currency is supposed to depreciate, but the empirical results showed the opposite (Froot and Thaler, 1990, p. 182) and the anomaly was sufficiently robust that it was codified in indices by FTSE, Deutsche Bank, Barclays and others (FTSE International 2010b; S. Curcuru, Vega, and Hoek, 2010, p. 438; Melvin and Shand, 2010, p. 4). It has been described as a 'pure source of alternative beta... (with)... a long-term return over 30 years that is comparable to that of global equities and superior to that of global bonds' (Record PLC, 2009).

However, researching the carry trade is difficult because the regulatory data are incomplete (Lancastle 2014). Stocks are reported net in the SNA whereas flows are reported gross in the BOP. Significantly, 'while stocks are valued at end-period exchange rates, flows are recorded on the basis of transaction rates or rates which are closer to transaction rates' (Reserve Bank of India, 2010, p. 14). 'Balancing transactions' are reported ex-post as a residual, after accounting for 'any valuation changes such as that caused by changes in exchange rates and other adjustments' (Wang, 2005, p. 60-61). In other words, profits and losses due to foreign exchange are obscured.

This research sits with a broad body that calls for better co-ordination of global liquidity and publicly managed international payment systems (Rochon 2004; Davidson 2005; Camara Neto and Vernengo 2005; D'Arista 2009; **Chapter Two**). Within the stock-flow consistent literature, the interest rate is simply a mark-up by which banks make profits after accounting for non-performing loans, deposit interest and expenses (Godley and Lavoie, 2007, p. 401). Below a certain interest rate, banks and investors cannot make profits from lending and seek profits from speculation, borrowing cheaply to invest in higher-yielding assets (Lancastle, 2011). The following sections

investigate whether these speculative processes are endogenous, who are the winners and losers, and what impact the carry trade has on international financial stability.

Data

Carry trade gains and losses are calculated using spot rates, forward rates, interbank rates and overnight rates. Spreads are fixed at six basis points. This is similar to the FRB5 index which applies a fixed spread of six or eight basis points around the mid-rate (FTSE International 2010b, p. 16). FTSE International use proprietary overnight rates prior to August 1998 then British Bankers' Association LIBOR (BBALIBOR) rates; the Tokyo overnight average (TONAR); Sterling overnight average (SONIA); Euro overnight average (EONIA); and a Swiss Franc tomorrow/next index swap (CHFTOIS) (FTSE International 2010b, p. 15).

For comparison with the FRB5 index, two sets of rates are used to estimate carry trade returns: BBALIBOR rates and overnight rates. In interbank markets, BBALIBOR rates are the price at which private banks lend funds to each other; the overnight rate is the target rate at which the central bank lends. The exchange rate between currencies not listed is calculated by triangulation via Sterling at the mid-rate.

	Currency	Description	Source	Datastream	History
Spot rates	JPY	Japanese Yen to Sterling spot	WM/Reuters	JAPAYEN	55 yrs
	USD	US Dollar to Sterling spot	WM/Reuters	USDOLLR	55 yrs
	GBP	Sterling to US Dollar spot	WM/Reuters	UKDOLLR	55 yrs
	CHF	Swiss Franc to Sterling spot	WM/Reuters	SWISSFR	47 yrs
	EUR	Euro to Sterling spot	WM/Reuters	EURSTER	54 yrs
Interbank ⁹	JPY	Japanese interbank one month	BBA	BBJPY1M	18 yrs
	USD	US interbank one month	BBA	BBUSDIM	18 yrs
	GBP	UK interbank one month	BBA	BBGBP1M	18 yrs

⁹ Previously known as LIBOR, now IBA rates and used as the underlying reference price for derivatives. Contributing banks quote the rate at they could borrow funds just prior to 1100 hrs. The published rate is an average rate for that particular currency.

	CHF	Swiss interbank one month	BBA	BBCHF1M	18 yrs
	EUR	Europe interbank one month	BBA	BBEURIM	18 yrs
Overnight	JPY	Basic discount rate ¹⁰	Bank of Japan	JPDISCR	58 yrs
	USD	US Federal Funds target rate ¹¹	FRB of New York	FRFEDFD	59 yrs
	GBP	UK Bank of England base rate ¹²	Bank of England	UKPRATE	64 yrs
	CHF	Swiss interbank rate ¹³	Swiss Economic Institute	SWIBKTN	42 yrs
	EUR	Discount rate/short-term Euro repo rate ¹⁴	Bundesbank	BDPRATE	63 yrs

Table 6.1: Spot, interbank and overnight rates. All observations are daily.

The Currency Composition of Official Foreign Exchange Reserves (COFER) database is used to estimate foreign currency profits and losses to central banks; these go back to 1995 (annually) and 1999 (quarterly). All COFER data are published in US Dollar prices and are aggregated as ‘advanced’ and ‘emerging and developing’ economies. For each of the G5 (Japan, US, Europe, Switzerland, UK) as well as Russia and China, the domestic currency is excluded from the ‘currency basket’.

Central bank foreign reserves assets are available in the IFS from 1993 for the Swiss National Bank; 1994 for the People’s Bank of China in 1994; 1996 for the Bank of

¹⁰ The Bank of Japan conducts open market operations at the basic discount rate, such as rediscounting bills or extending loans to financial institutions. It is also the Bank of Japan's policy interest rate.

¹¹ In the United States, the main refinancing rate is the federal funds effective rate: the rate at which depository institutions lend balances at the Federal Reserve to other depository institutions overnight. The daily rate is a weighted average of rates on trades through New York brokers.

¹² The Bank of England’s official policy rate. From 1972 - 1981 this was replaced by a minimum lending rate which was set in a weekly tender; from 1981 – 1986 the bank began to publish a different dealing rate for loans of different duration (typically one to fourteen days); and after 2006 the bank also published an official bank rate which is paid on reserves.

¹³ There is no official overnight rate for Switzerland that covers the whole period.

¹⁴ The Bundesbanke rate is used because this time series goes back further than the European Central Bank rates. It is the main refinancing rate in the Eurosystem, with a maturity of two weeks.

England; 1997 for the Euro area; and 2001 for the Federal Reserve, Bank of Japan and Russian Federation. In Japan, the Ministry of Finance manages foreign currency assets and the return on these is estimated separately. To estimate losses to exporters, current account balances are as published in the SNA and made available in the IMF WEO database.

Carry trade calculations

Each month, ten trades are placed in each of the ten currency pairs (CHFUSD, CHFGBP, CHFJPY, CHFEUR, USDGBP, USDJPY, USDEUR, GBPJPY, GBPEUR, JPYEUR): the low interest rate currency is borrowed and the high interest rate currency is lent or invested. After one month, the trade is settled at the prevailing spot rates and the profit or loss over the period is calculated as the interest rate differential plus the foreign exchange profit or loss minus the spread (**Equations 6.1 and 6.2**) and an arithmetic mean is calculated (**Equation 6.3**). The cumulative total return is the product of the monthly total returns, and assumes the profit is reinvested equally in the ten currency pairs (**Equation 6.4**):

$$\text{Equation 6.1: } \text{If } r_1^{t-1} > r_2^{t-1} \text{ then } PL_1^t = r_1^{t-1} - (IR_2^{t-1} * \frac{XR^{t-1}}{XR^t})$$

$$\text{Equation 6.2: } \text{If } r_1^{t-1} < r_2^{t-1} \text{ then } PL_1^t = (r_2^{t-1} * \frac{XR^{t-1}}{XR^t}) - r_1^{t-1}$$

$$\text{Equation 6.3: } PL^t = \sum_1^n (PL_1^t + PL_2^t + PL_3^t + \dots) / n$$

$$\text{Equation 6.4: } PL = (PL^t * PL^{t+1} * PL^{t+2} \dots PL^{t+n})$$

Where r_1^{t-1} = interest rate on the first currency at time t-1; r_2^{t-1} = interest rate on the second currency at time t-1; PL_1^t = profit/loss on trade in single currency pair between t-1 and t; XR^{t-1} = exchange rate at time t-1; XR^t = exchange rate at time t; PL^t = profit/loss on n currency pairs from t-1 to t; PL = the cumulative total return on n currency pairs over time

In fact, there are wide variations in spreads over the period. Before the 2008 crisis, US Dollar spot spreads were in the range 0.2 – 0.5 basis points, but they increased to between 10 and 30 basis points during the crisis (Melvin and Taylor 2009, Table 1).

Running simulations with spreads from 100 basis points down to 6 basis points shows four main interest rate regimes where the spreads narrow significantly. These regimes correspond to transitions in the risk and return characteristics of the return series; these transitions are studied in more detail in the next two sections.

The first phase until August 1990 had interest rate differentials above 80 basis points and was a period of Swiss and Yen funding. US Dollar rates fell sharply after August 1990 when investment banks like J.P. Morgan and Morgan Stanley were able to offer commercial loans: the 'de facto repeal of Glass–Steagall' (Reinicke 1995, p. 114). Interest rate differentials fell below 60 basis points and the Swedish banking crisis of 1992 marked the first extreme event in the carry trade series (**Figure 6.2**). The next phase marked the start of the Great Moderation and was supported largely by cheap Yen and Swiss funding. The lowest funding rate fell below 0.5 per cent in 1996 and below 0.1 per cent in 1999, interrupted by three events: the Russian bond default in 1998, the Japanese banking crisis in 1995 and rate cuts in response to the dot-com bubble in 2001. After March 2006, funding rates rose, reaching 0.5 per cent in 2006 and around one per cent in August 2007 until the Lehman Brothers event when interest rate differentials fell further to below 20 basis points, cheap Swiss funding returned. Interbank rates reached a new low of around 33 basis points in September 2011 when the Swiss National Bank pegged the Swiss Franc to the Euro, pledging to buy "unlimited quantities" of foreign currencies and preventing the Swiss Franc from rising further.

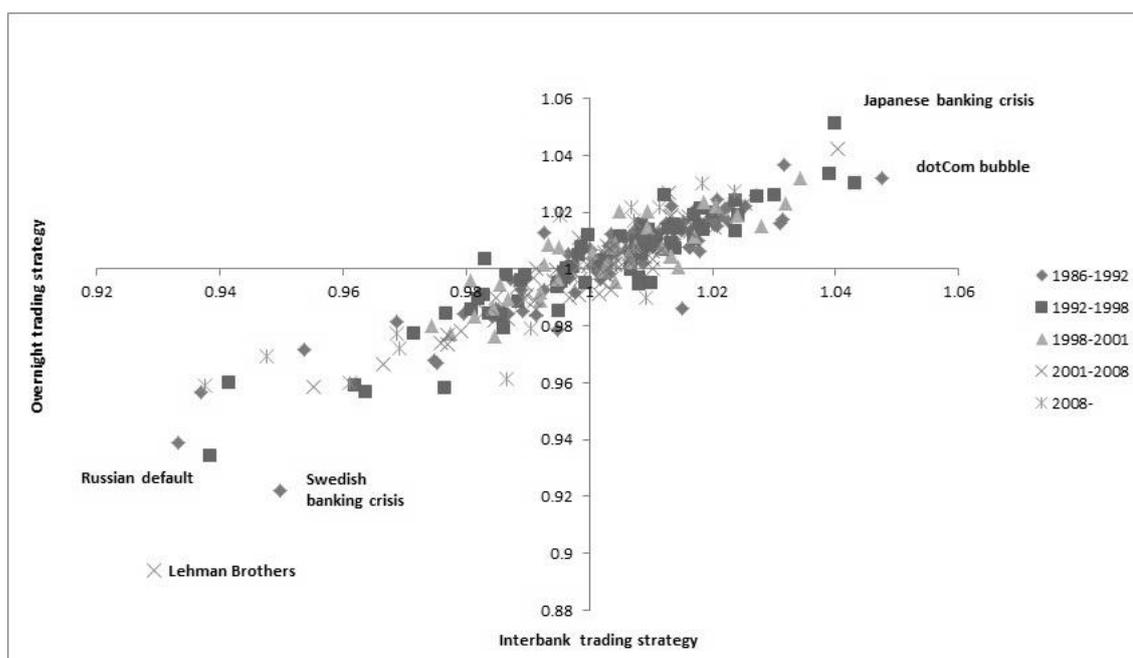


Figure 6.2. Financial crisis outliers. Trading strategy profits calculated from the interbank and overnight rates in **Table 6.1**.

Qualitative reports also point to a major unwinding of the carry trade prior to the GFC. Financing costs for hedge funds began to rise from mid-2005 (Becker and Clifton, 2007, p. 167). Practitioners describe the GFC as a major break: ‘it is not easy for scholars to appreciate fully the magnitude of the dislocations that have occurred in the FX market... fears were met on August 16, 2007: on this date, a major unwinding of the carry trade occurred and many currency market investors suffered huge losses’ (Melvin and Taylor, 2009, p. 1-2). Melvin and Taylor identify three main stages during the GFC: an initial deleveraging as risk appetites fell and investors sought to reduce risk, followed by a second stage where forced sales by prime brokers led to increased risk aversion among investors, and lastly a flight to quality as investors bought Treasury Bills and cash. No institution wanted to hold intraday currency risk for fear of having a ‘hot potato’ should there be another bank failure. After the Lehman bankruptcy in September 2008, currency market volatility rose to incredible levels and spreads were much larger: between Sterling and US Dollars there was a 5500 per cent increase in spread volatility as the ‘pound sold off dramatically in the fall of 2008’ (Melvin and Taylor, 2009, p. 13). Yet so ubiquitous was the strategy that the infamous bond trader

John Devaney, whose hedge fund collapsed in 2008, had named his yacht ‘positive carry’ in recognition (Eaglesham, 2012).

Figure 6.3 suggests that there have been higher carry trade returns when borrowing and lending in the interbank market. This implies there was an incentive within the market structure to borrow and invest across borders. Since funds are borrowed in countries where the interest rate is low and invested in countries where the interest rate is high, this undermines domestic monetary policy: central banks lower interest rates to stimulate domestic investment, not foreign. Since LIBOR rates underpin derivative pricing, the implication is that derivative markets had the same endogenous tendency to undermine domestic monetary policy.

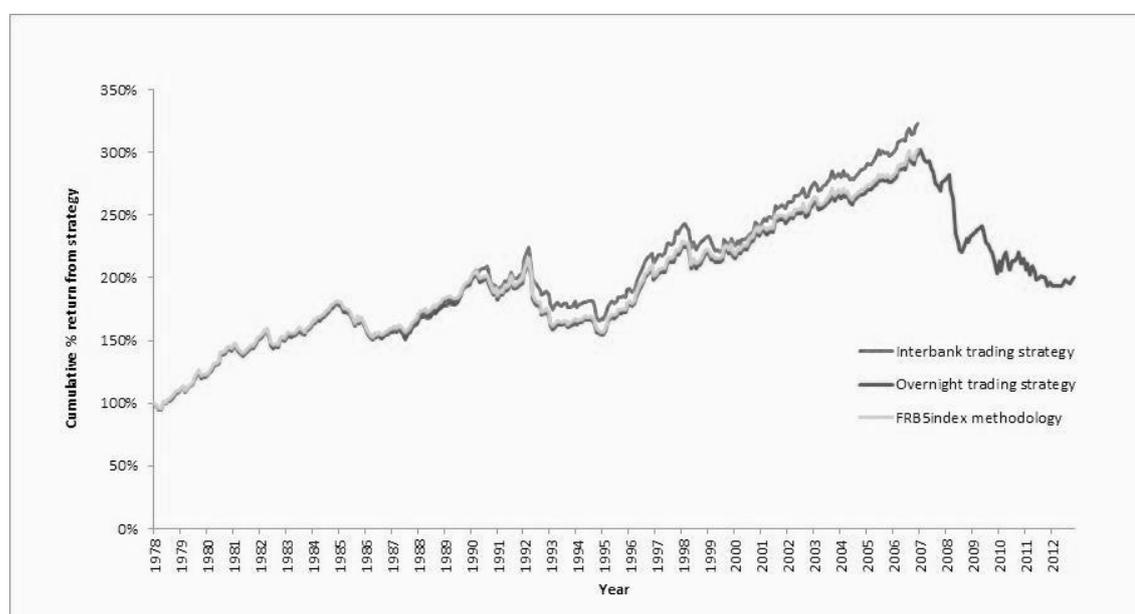


Figure 6.3. Carry trade total returns. Calculations and data sources as above. For full details of the FRB5 methodology see (FTSE International, 2010b, p. 15).

There is no evidence that the carry trade was arbitrated away by higher turnover. Despite an ‘unprecedented 72% rise in currency market activity between 2004 and 2007’ (M. R. King and Rime, 2010, p. 27) there was no decline in the carry trade. Turnover peaked at the height of the crisis then ‘in the aftermath of the Lehman Brothers bankruptcy, activity fell substantially, to almost as low as \$3 trillion a day in April 2009, and it did not return to its previous peak until the beginning of 2011’ (Bech,

2012, p. 34). These reports suggest a positive correlation between turnover and the carry trade.

Major reversal of carry trade returns tends to occur *after* banking crises (**Table 6.2**): the Swedish banking crisis was in September 1992 and the carry trade reversed in October 1992; the Russian bond default was on 17 August 1998 and the carry trade reversed in October 1993; and the most significant reversal was in October 2008 after the collapse of Lehman Brothers. Rate cuts in response to non-banking crises, the 9/11 attacks on the World Trade Centre (Neely 2002, p. 12) and in response to the dot-com bubble, had the opposite effect and profits rose.

Interbank Return	Overnight return	Difference	Event
-7.07%	-10.61%	-3.55%	Lehman Brothers collapse, Oct 2008
-6.67%	-6.11%	0.56%	Swedish banking crisis, September 1992
-6.15%	-6.58%	-0.43%	Russian bond default, October 1998
-5.02%	-7.81%	-2.79%	Swedish banking crisis, October 1992
3.99%	5.12%	1.13%	Japanese banking crisis, August 1995
4.03%	4.24%	0.20%	US rate cuts in response to dot-com, December 2001

Table 6.2. *The difference between carry trade return in overnight and interbank markets.*

The overall picture is a skewed payoff with the returns ‘going up by the stairs and coming down in the elevator’ (Plantin and Shin, 2011, p. 5). Central bank interventions during banking crises (the liquidity put) can sometimes result in higher profits but more often are accompanied by a sharp reversal. The next sections investigate whether this process creates systematic winners and losers, by disaggregating the carry trade by period, currency and currency pair.

Estimating winners and losers

Japan ran a trade surplus more or less continuously after the collapse of Bretton Woods, yet an export in 1975 that was worth 3000 Yen would have earned ten British Pounds and be worth only 860 Yen in 2013. Swiss exporters would have lost a similar amount over the whole period (**Table 6.3**). Among the G5, Europe and the UK were the worst countries for exporters between 1975 and 2013:

Code	Currency	02/01/1975	01/01/2013	Change	Source
EUUSBOE	Euro	0.7633	0.7563	101%	Bank of England
SWUSBOE	Swiss	2.5375	0.9132	278%	
JPUSBOE	Yen	300.75	86.09	349%	
USSTBOE	Dollar	2.34	1.62	144%	

Table 6.3. Changes in exchange rates relative to Sterling between 1975 and 2013.

To get a more accurate figure for central bank profits and losses on the exchange rate, the COFER database would need to include the currency composition for each central bank. Alternatively, the central bank itself would report currency profit and loss. Since neither is available, 'currency baskets' are calculated from the COFER database with the domestic currency excluded. Similar to the carry trade methodology, 'currency basket' profit and loss are estimated as a total return series excluding the interest rate return (**Equations 6.5 to 6.8**):

$$\text{Equation 6.5: } PL_1^t = (XR^t - XR^{t-1}) \cdot w_1^t$$

$$\text{Equation 6.6: } PL_{basket}^t = 1 + (PL_1^t + PL_2^t + \dots + PL_n^t)$$

$$\text{Equation 6.7: } PL_{basket} = (PL_{basket}^t * PL_{basket}^{t+1} * \dots * PL_{basket}^n)$$

$$\text{Equation 6.8: } PL_{actual} = \sum_1^t (PL_{basket}^t * reserves^t)$$

Where PL_1^t = the foreign exchange profit/loss on each currency pair; w_1^t = COFER weighting for that currency in the basket at time t ; XR^{t-1} = exchange rate at the

beginning of the period; XR^t = exchange rate at the end of the period; PL_{basket}^t = the weighted average foreign exchange profit/loss from time $t-1$ to t ; PL_{basket} = the currency return series for each theoretical basket; $reserves^t$ = reported foreign exchange reserves (or trade deficit); PL_{actual} = the estimated currency return on actual reserves

In **Equation 6.7** this return series is equally weighted and the results, at least from 2000, give the impression that currency is a zero-sum game. The GFC appears as a sharp correction with Russia, in particular, seeing a rise in the value of their foreign reserve assets:

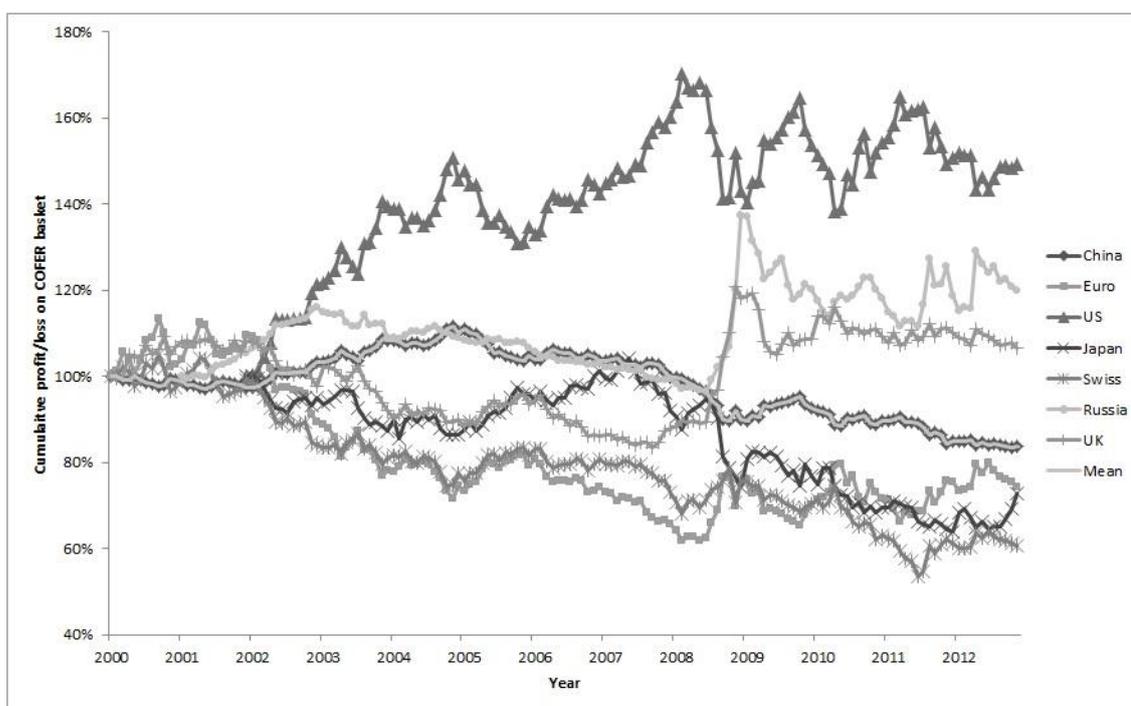


Figure 6.4. Equally weighted 'currency basket' returns on major currencies. Re-based to 100 in January 2000 (December 2001 for US and Japan to reflect availability of data in the IFS).

However, using weights based on the actual value of foreign exchange reserves (as reported in US Dollars in the IFS), the most striking pattern is that foreign reserve assets in Europe and China have absorbed large foreign exchange losses. From 1997

(when COFER estimates data are first available) to September 2000 Euro area central banks made foreign currency *gains* on their reserves in the early part of the period: an estimated €162 billion. However, with Germany's trade surplus, foreign currency gains were wiped out by 2003, resulting in an accounting loss across the Euro area central banks of over €140 billion by February 2008. These Euro area central banks losses are dwarfed by an estimated 600 billion US Dollar loss at the Central Bank of China by the end of 2012:

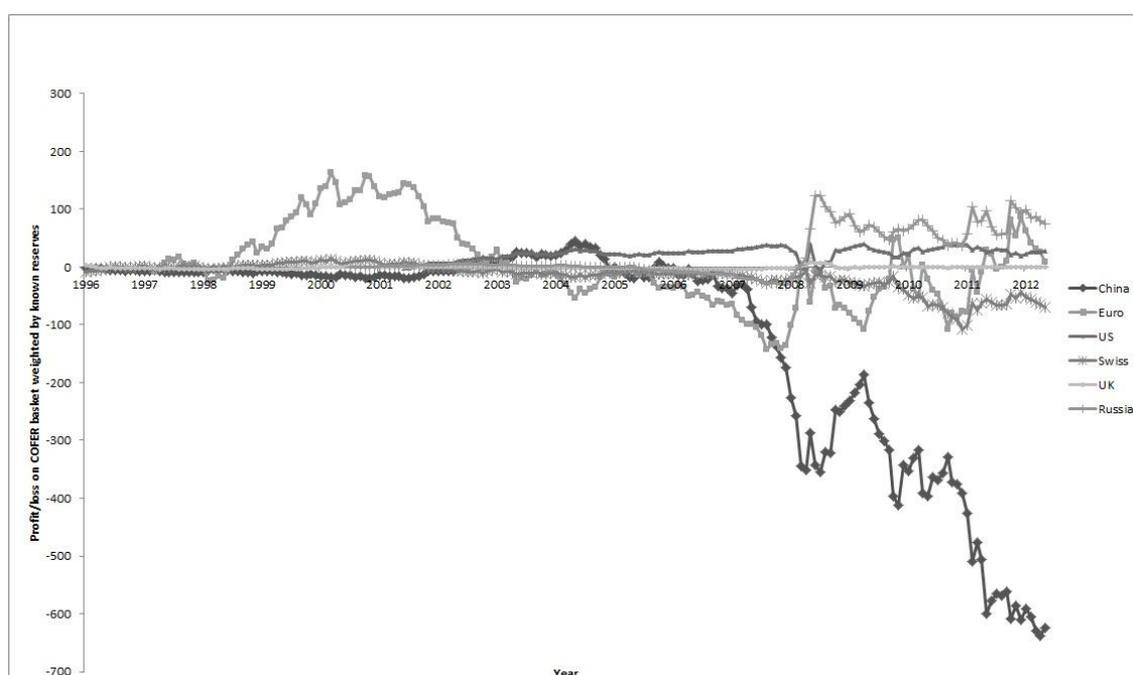


Figure 6.5. 'Currency basket' returns weighted by reported central bank foreign reserve assets.

For Japan, the Ministry of Finance (not the central bank) holds foreign reserve assets¹⁵, with significant purchases between January 2003 and March 2004 (Gerlach-Kristen et al. 2012, p. 3):

¹⁵ For Japan, the COFER 'currency basket' shows US Dollars as around 70 per cent of foreign reserves in 2003-4. This is a conservative estimate for Japan, which may hold as much as 90-95 per cent US Dollars in their foreign reserves (Gerlach-Kristen et al. 2012, p. 4).

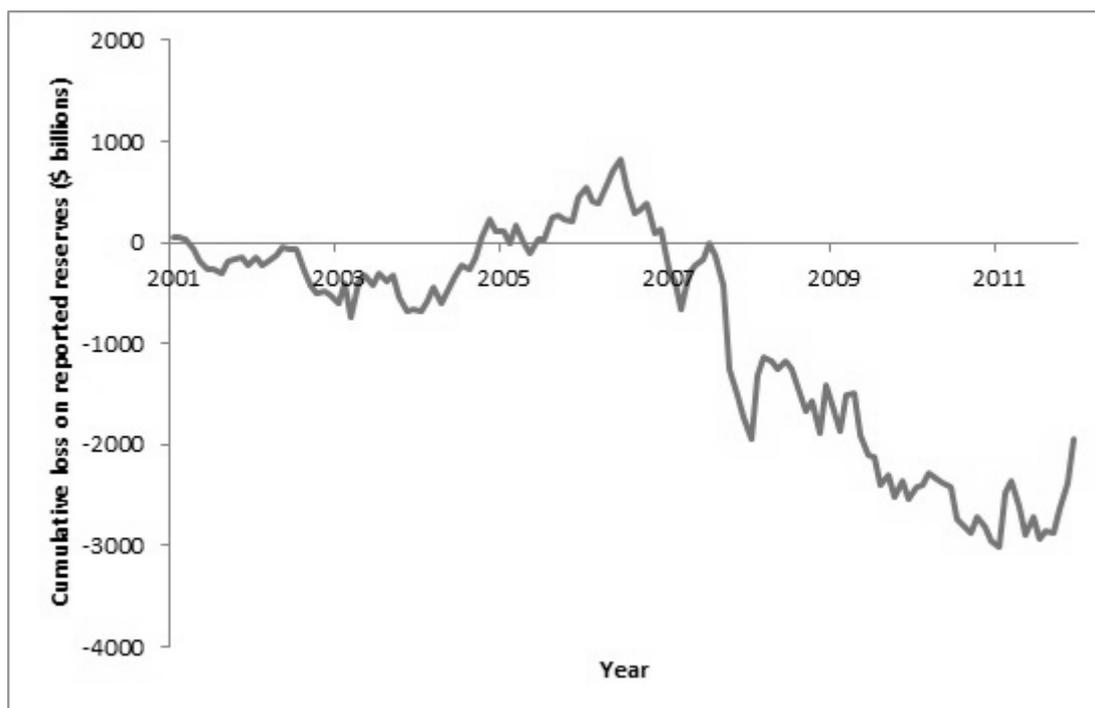


Figure 6.6. *Estimated returns on Japanese Ministry of Finance foreign currency assets. Re-based to December 2001.*

A similar estimate for the current account (**Figure 6.7**) suggests that Germany and Japan, in particular, made foreign exchange losses: either exporters or private investors if foreign trade receipts were exchanged for local currency. In China, exporters were isolated from such losses because the central bank sterilised foreign currency flows: hence the large losses at the central bank.

In a stock-flow consistent framework, there cannot be foreign exchange losses within the national accounts as a whole, since everything is denominated in the same base currency. If foreign exchange losses are attributable to central banks and to surplus countries, then foreign exchange profits must be attributable to deficit countries.

There is also the intriguing question of the negative wealth effects in surplus countries from declining foreign investments, particularly when the central bank does not exchange foreign currency for domestic.

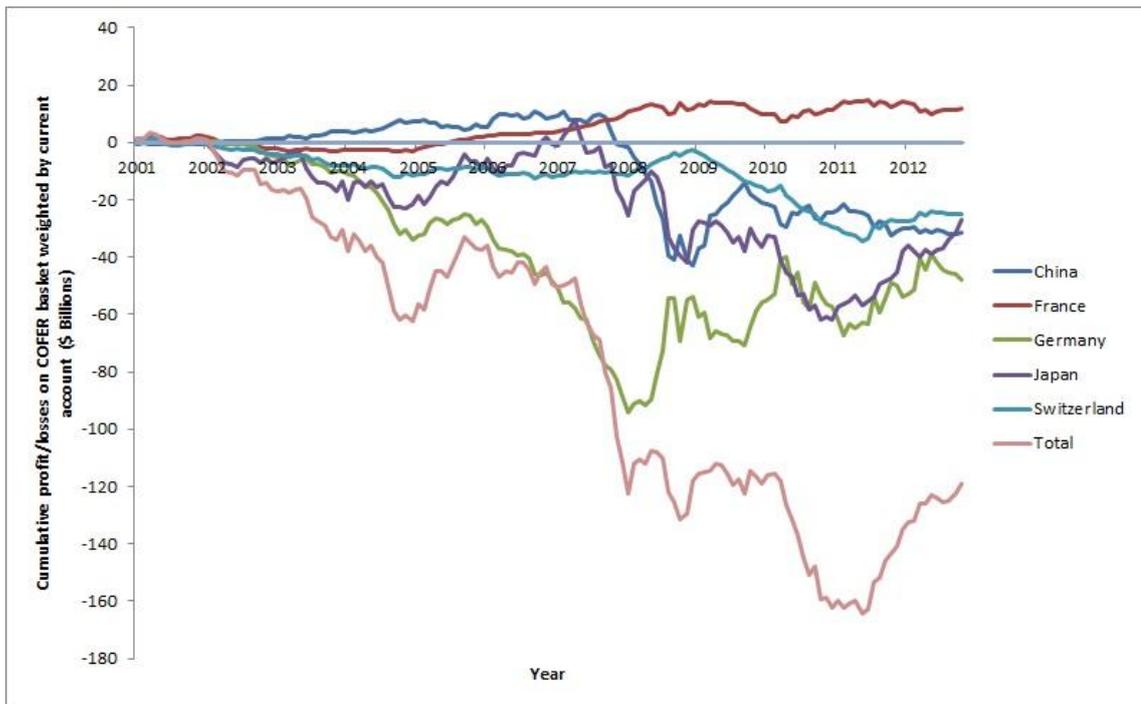


Figure 6.7. 'Currency basket' returns weighted by current account. All data re-based to December 2001.

Disaggregating the trade

The outliers in **Figure 6.2** are chosen to disaggregate the carry trade into four phases: before the Swedish banking crisis; until the Russian bond default; the Great Moderation; and after the collapse of Lehman Brothers. Each phase is marked by a different mean and variance, which has implications for the methods of stochastic calculus used in modern finance (CAPM and Black-Scholes derivative pricing) that could be explored further. For example, there are divergent time series, like the Cauchy distribution, that have 'neither a mean nor a variance' (Harris and Glatzer, 2012, p. vii) but retain the symmetric, bell-shaped appearance of the Gaussian.

During the last phase of the 'Great Moderation' the ten-month mean settles into a tight range and the variance drops to an all-time low from 2005 to 2006. This is consistent with the ideas that 'stability is destabilising' (Minsky, 1982, p. 101) and that 'the fundamental instability of a capitalist economy is upward: the tendency to transform doing well into a speculative investment boom is the basic endogenous disequilibrating factor' (Minsky 1975b, p. 9):

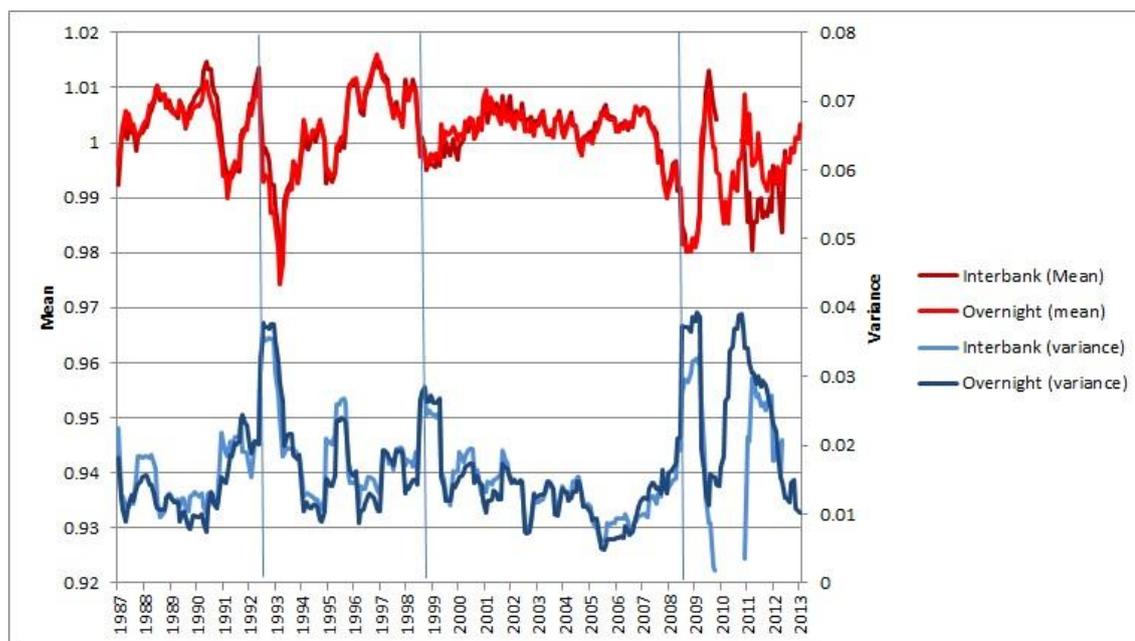


Figure 6.8. Time-varying mean and variance for the overnight and interbank carry trades. The vertical blue bars mark the Swedish banking crisis (September 1992); the Russian bond default (August 1998) and the Lehman Brothers collapse (September 2008).

The profit and loss in overnight markets is generally lower than that in interbank markets. Linear extrapolation suggests that, if G5 overnight rates are zero, interbank rates still offer a positive carry trade return. This is consistent with the idea that the carry trade is driven endogenously by the private sector. The expected intercept is zero, assuming there is no systematic difference in the term and risk premium (however, note that the Bundesbank rate in **Table 6.1** is for a two week maturity). The overnight returns are more negatively skewed with strongly kurtosis (4.00 versus 2.33). The skew and kurtosis are consistent with the carry trade being an endogenous process, with private banks setting prices during normal times and the central bank setting prices as lender of last resort during crises. **Table 6.4** also shows potential shifts in the skew and intercept prior to and after the collapse of Lehman Brothers. These findings warrant further investigation to see if they are robust using a more extensive set of currencies; comparing returns prior to 1987; testing with alternative sources for

spot, overnight and interbank rates; and devising a method to estimate continuous returns¹⁶.

Phase	Slope	Intercept at zero overnight rates	R^2	Skew: Overnight	Skew: Interbank
Whole period	0.912	+0.088	0.831	-1.187	-1.052
Before the Swedish banking crisis	0.875	+0.125	0.832	-1.535	-1.177
Until the Russian bond default	0.911	+0.098	0.864	-0.911	-0.805
Great Moderation: Russian bond default to dot-com bubble	0.771	+0.230	0.746	-0.155	+0.096
Great Moderation: dot-com bubble to Lehman collapse	1.010	-0.101	0.897	-2.683	-1.575
Great Moderation: dot-com bubble to Lehman (excluding collapse)	0.960	+0.040	0.887	-0.450	-0.703
After Lehman	0.870	+0.136	0.741	-0.002	-0.850

Table 6.4. *Time-varying mean and variance in more detail*

Lastly, the overnight carry trade returns are disaggregated by currency and currency pair. To estimate returns to each currency, profit and loss are split equally between the funding and investment currency to estimate the return for that currency: in any one month, each currency has five trades (buy or sell) and half the return is assigned to

¹⁶ Discrete (linear) and continuous (compounded) returns are 'at times used interchangeably...this practice has dangerous repercussions' (Meucci 2010, p. 1): the discrete return aggregates across securities whereas the compounded return aggregates over time. These problems are common to index methodologies.

each currency in the trade. To estimate returns to each currency pair, the profit and loss are estimated for each trade.

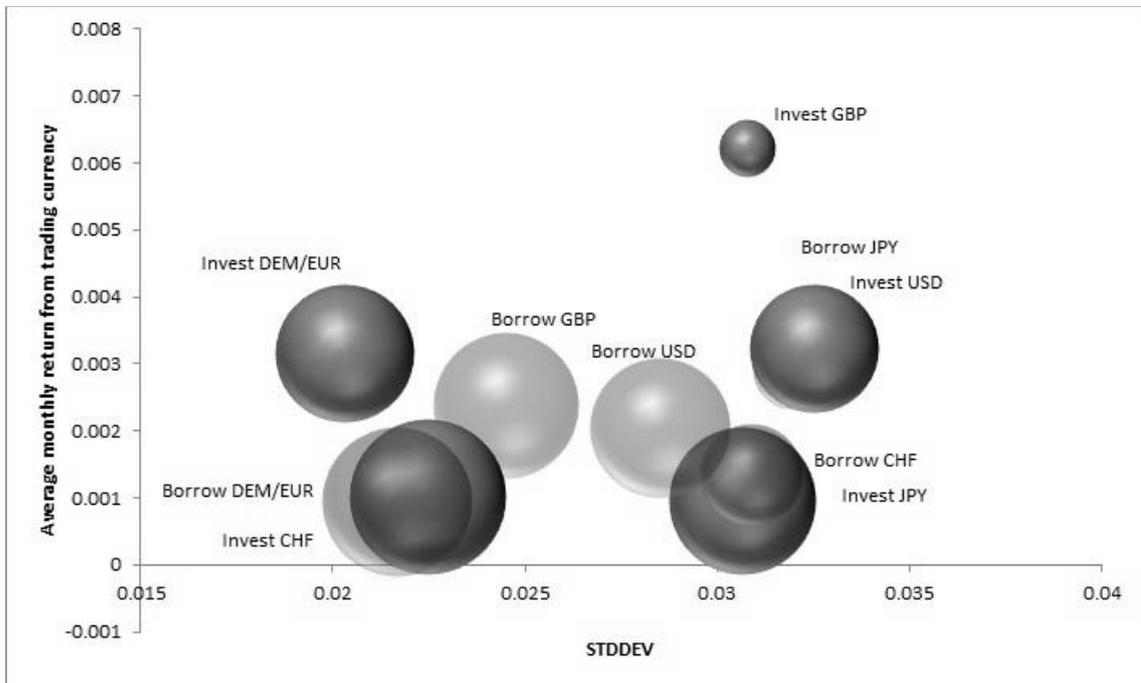


Figure 6.9. G5 overnight carry trade broken down by currency and trade type. Data from June 1978 to April 2013. Bubble size indicates the number of trades.

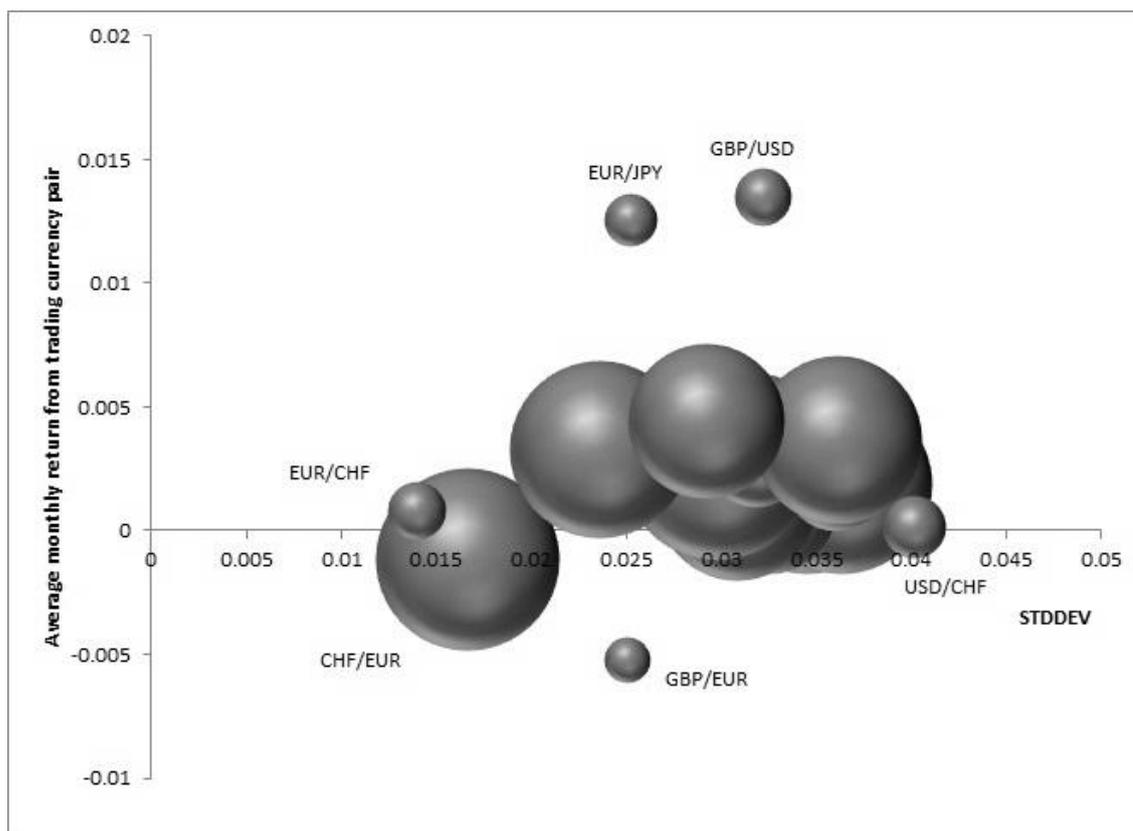


Figure 6.10. G5 overnight carry trade broken down by currency pair. Data from June 1978 to April 2013. Bubble size indicates the number of trades.

Both methods tell a similar story: the relationship between risk and return is uncertain. **Figure 6.9** shows that the US Dollar, Japanese Yen and Sterling play a central role as funding currencies, providing international liquidity: this is consistent with the wider literature on financialisation in the UK and US (Barwell and Burrows, 2011; Haslam et al., 2012; Stock and Watson, 2002). **Figure 6.10** also suggests a co-ordination problem, with a central core of larger currency pairs surrounded by smaller satellites as outliers. However, there is no evidence from either figure that higher risk means higher return.

Summary and conclusions

The carry trade undermines monetary policy: central banks cut rates and provide liquidity to stimulate domestic investment, so this policy is weakened when that funding flows into investment abroad. The boom and bust in G5 currency markets (**Figure 6.3**) is consistent with the wider literature on financial crises (Kindleberger and

Aliber, 2011) and is consistent with the idea that speculative capital flows and an investment boom, if countered by higher rates under inflation targeting, can lead to overshooting.

With interbank rates at near zero (**Figure 6.1**) there is a risk to financial stability if cheap funding inflates new bubbles. The skew and kurtosis of the return series suggest the process is endogenous: there is a positive carry trade return in interbank markets even when central bank rates are zero. Since LIBOR rates are used extensively in derivatives pricing, this suggests the same endogenous process at work in these markets. This process is underpinned by central banks providing a liquidity put until the financial system has reconfigured. Disaggregation of the risk and return (**Figure 6.8, Figure 6.9 and Figure 6.10**) suggests that central banks are price setting during financial crises until the system settles into a 'new normal' in terms of the mean and the variance. If the mean and variance are time-varying, the mathematical methods of stochastic calculus that underpin modern finance are rendered impotent, particularly during crises. These results are consistent with the wide literature on endogenous money: cheap money in the interbank markets flows across borders in search of higher yield.

Currency profits and losses do have distributional effects, which has implications for the central bank. Deficit countries have been the main beneficiary, on the basis that foreign exchange losses in one country are balanced by profits in another. Prior to the GFC, export countries and the European central banks were incurring large foreign currency losses on their external positions; after the GFC, the People's Bank of China and Japanese Ministry of Finance have incurred even larger balance sheet losses (up to one trillion US Dollars). To understand these distributional effects better, the central bank and national accounts could include currency profits and losses in their reporting (Lancastle, 2014).

Simulating the carry trade offers a simple way for central banks to estimate the effects of uncoordinated changes to interest rates. The methodology, if developed, offers the possibility of having a mixed target for monetary policy, a combination of interest and exchange rates, to mitigate the effects of speculative capital flows (see **Chapter Three**

on exchange rate targeting). The methodology could be extended to include more currencies: such as carry trades between the BRIC-G5 and MINT-G5. The times series data could go back much earlier than June 1978; real spreads could be used rather than a fixed spread; triangulation could be to other currencies; alternative sources for spot, overnight and interbank rates could be tested; better account could be taken of collateral costs; the simulation could be compared with one that estimates continuous returns; and the 'currency basket' weights could be based on bilateral trade data and real balance sheets. The methodology offers a broader way to highlight currency risks. In a full set of disaggregated accounts, the impact of monetary policy on speculative capital flows could be better understood.

In a stock-flow consistent framework, banking profits are funded from interest rate income (Lancastle, 2011): as interest rates approach zero, the financial system becomes more susceptible to default risk and financial crises. Understanding foreign exchange profit and loss is a first step to identify where risks lie. Taxes, revised collateral arrangements or lending guidelines might be a better policy tool to reverse or prevent localised effects from speculative capital flows, such as property bubbles. Together, these approaches might boost monetary policy when interest rates approach zero by ensuring domestic investment rather than speculation on foreign assets. Central banks might well benefit from having better insights into the carry trade.

There is some room for optimism. If there is a co-ordination problem in currency markets, then the setting up of 'unlimited swap lines' between central banks, such as those between the Federal Reserve and Bank of Japan (Rose and Spiegel, 2011, p. 42), creates new possibilities for co-ordination and liquidity management. Reciprocal swap arrangements were extended between the Fed, G5 and Canada during the crisis (Swiss National Bank, 2012). More recently, the Central Bank of China established reciprocal swap lines with the Bank of England (Bank of England, 2013) and signed a Memorandum of Understanding regarding renminbi clearing and settlement in London (Bank of England, 2014). Whether these bilateral arrangements herald a new era in global co-ordination, or simply mark a reconfiguration of financial power, remains to be seen.

CHAPTER 7: Circuit theory: the role of speculation in crises

This Chapter investigates whether behavioural differences in the financing decision can explain long-term carry trades; persistent asset bubbles or zero lower bounds; and financial crises. It extends Godley and Lavoie (Monetary Economics: An Integrated Approach to Credit, Money, Income, Production and Wealth, 2007) and the Theory of the Monetary Circuit (Graziani, 1989) to give a mathematical representation of Minsky's Financial Instability Hypothesis. In the extended circuit, the central bank rate is not neutral and the path taken by stocks and flows is non-ergodic. The model has constraints that include a living wage, a zero interest rate and an upper interest rate beyond which households become insolvent. Inflation is everywhere: there are inflationary effects from goods prices, wages, asset prices and as a consequence of monetary policy.

The possibility of stable carry trades emerges between a high interest rate, hedge economy and a low interest rate, Ponzi economy. In the high interest rate, hedge economy, powerful banks invest surplus loan interest. With speculation, banks lobby to enter investment markets to compete for a share of profits, and the banking sector relies on liquidity to remain solvent. In a Ponzi economy, where most loans never get repaid, bank solvency deteriorates as the bubble forms and improves during systemic crises. Simulating bank bailouts, household bailouts and a Keynesian boost suggests that bank bailouts are the least effective intervention, exerting downward pressure on wages and household spending: austerity.

The approach in this chapter is implemented using an accounting framework where 'everything comes from somewhere and everything goes somewhere' (Godley and Lavoie, 2007, p. 6). As a minimum, the Godley and Lavoie models have three sectors: banks, households and businesses, where there 'cannot be any *black hole*.... the fact that money stocks and flows must satisfy accounting identities in individual budgets and in an economy as a whole provides a fundamental law of macroeconomics analogous to the principle of conservation of energy in physics' (Godley and Lavoie, 2007, p. 14).

This model is consistent with and extends the Theory of the Monetary Circuit, which is attributed to Graziani and the 'French and Italian post-Keynesian school, the so-called circuitistes' (Godley and Lavoie, 2007, p. 47). In the original form of the Monetary Circuit, the first step is when banks lend to businesses. Businesses use this *initial finance* to buy labour. The initial circuit closes when households spend their wages, either on immediate consumption, or by purchasing financial assets that have been issued by businesses. In subsequent circuits, businesses only borrow the additional money they need to finance production. Although the role of credit money was re-emphasised after the collapse of Bretton Woods, there is evidence across Europe and Asia that for the last five thousand years there has been a 'broad alternation between periods dominated by credit money and periods in which gold and silver come to dominate' (Graeber, 2011, p. 213).

In discussing the role of banks, Graziani emphasised that 'in any model of a monetary economy, banks and firms cannot be aggregated into one single sector' (Graziani, 1989, p. 159). He considers four agents i) a central bank ii) private banks ii) firms and iv) wage-earners or households. Stocks of non-commodity money are increased or decreased by the debt and credit operations taking place between the central bank and private banks. With a single bank, there is 'an unlimited credit potential, and ... no risk of insolvency' (Graziani, 1989, p. 524). With more than one bank, 'there is (still) no limit to the amount of bank-money which the banks can safely create, provided that they move forward in step' (Keynes 1930, p. 23).

With unlimited liquidity, Godley and Lavoie argue that long-run, global imbalances are possible between economies, provided the central bank of the surplus country is able (and willing) to buy the debts of the deficit country. In a model which they liken to China and the US, there is no intrinsic limit to the process where 'Chinese exporters receive, for their increased sales abroad, an additional flow of dollars which they exchange with their central bank for their own currency. The... People's Bank of China ... exchanges (these) for US Treasury bills. Beyond these two exchanges, the People's Bank of China neither needs nor wants to do anything at all' (Godley and Lavoie, 2007, p. 470).

Banks can generate monetary profits from the circuit indefinitely, 'even if their ventures are 100 per cent debt-financed' (Keen, 2010, p. 4). Keen simulates the effects

of an exogenous injection of money into either i) the bank vault or ii) household deposit accounts, to gain insights into responses to the GFC.

	Transaction	Type	Bank vault	Bank transaction	Firm loan	Firm deposit	Worker deposit
1	Lend money	Flow	$-a$			a	
2	Record loan	Account			a		
3	Compound debt	Account			b		
4	Pay interest	Flow		c		$-c$	
5	Record payment	Account			$-c$		
6	Deposit interest	Flow		$-d$		d	
7	Wages	Flow				$-e$	e
8	Deposit interest	Flow		$-f$			f
9	Consumption	Flow		$-g$		$g + h$	$-h$
10	Repay loan	Flow	i			$-i$	
11	Record payment	Account			$-i$		
12	Government policy	Exogenous injection into either B_v or W_D					$+I$
	Σ		$i - a + I$	$c - d - f - g$	$a + b - c - i$	$a - c + d - e + g + h - i$	$e + f - h + I$

Table 7.1. Keen's Core Model. Adapted from (Keen, 2010, p. 24)

Following the principle that 'everything comes from somewhere and everything goes somewhere', each of the flows ($a-i$) results in a debit or credit on one or more accounts. Keen's system is dynamic: notes flow to firms from the bank vault, firms pay wages and interest, and workers receive wages and interest. Critically, both banks and households consume. This consumption allows firms to repay their loans and close the circuit.

Using estimated model parameters, Keen simulates the effects of injecting government money into either bank vaults or worker deposits. He concludes that injecting money into worker deposits to 'go early, go hard, go households' (Gruen, 2008) would have a more immediate and substantial effect during financial crises.

This Chapter repeats those simulations with a revised model and a *second monetary circuit* where banks lend to households, and households invest in property. Bank and household spending are treated as the redundant equations, to gain insights into the role of liquidity.

In their growth model prototype, Godley and Lavoie 'assume that households as well as firms borrow from banks' (Godley and Lavoie, 2007, p. 378) but these new loans are determined, not by asset prices, but as a proportion of disposable income. This model relaxes that constraint. Indeed, the US Financial Crisis Inquiry Report (Financial Crisis Inquiry Commission, 2011, p. 62) showed how financial sector wages outstripped non-financial, starting in the 1980s. This combination of a relative fall in wages, rising asset prices, and rising household loans, was also apparent in the UK.

In this model, investment gains provide a boost to spending. Banks spend their income from lending, which places them in competition for consumption. With speculation, banks can also compete for investment gains on financial assets. Spending has two elements, i) immediate consumption and ii) deferred consumption which is invested in financial assets. The model could be modified to show multiple investment markets, with different levels of investment gain: there is no limit to the further disaggregation

of sectors, or to the addition of new financial assets. Therefore the impact of any asset bubble, in any sector, could be modelled.

Keen, and Godley and Lavoie, have already introduced the possibility of modelling shocks to flows such as wages. An extreme shock might be a natural disaster or epidemic that wipes out households or business assets, impacting the ability of firms to produce and sell goods: as a consequence, loans would not get repaid and the circuit does not close. Predictable events could also be modelled: demographic trends from ageing and improving healthcare, or migration, or the impact of climate change. Accounting models also introduce the possibility of simulating the effect of taxes (on wages, investment and lending), and step changes in behaviour or expectations (such as new financial products that alter loan characteristics).

In this model, government is not included, so the effect of government spending and taxes is not taken into account. Government spending will impact households, businesses and banks, and the challenges from modelling this are discussed in **Chapter Eight**. Lastly, the model assumes inflation has the same impact on asset prices, wages, commodity prices and consumer goods, which is unrealistic but allows a partial analysis of the effects of financing behaviour on the model.

Hence, the model circuit has three sectors (households, banks and businesses) that can make hedge, speculative and Ponzi investments, where:

- i. The hedge borrowers repay their loans from realised investment cash flows
- ii. The speculative borrowers repay their loans from realised investment cash flows. However, they roll over their debts regularly, re-investing capital gains to produce (businesses), or using them to boost spending (households)
- iii. The Ponzi borrowers rely on their investments being profitable. In doing so, they do not wait until profits are realised. In a simple, accounting sense, they use

unrealised cash flows to increase production (businesses) or spending (households)¹⁷

iv. Inflation is everywhere

The models assume that investment markets do not clear fully, and that each sector has different motives for borrowing. In the *household circuit*, households borrow to invest in property, and defer a proportion of their spending (pensions). In the real world, some households will leverage and buy more properties, while other households pay them rent.

Following Graziani, in the *business circuit*, firms require *initial finance* to pay wages and begin production. In subsequent phases, firms raise capital by issuing financial assets, and use loans to invest in production and commodities. Hedge businesses repay initial finance when the full production cycle ends.

Bank loans and derivatives have a higher priority than equity in a bankruptcy and this pecking order is an important condition in ensuring banks remain solvent longer than households and firms. Ultimately, the central bank steps in if businesses and households cannot roll over their loans, to avert a liquidity crisis: this re-inflates the bubble and supports banking sector solvency by raising the value of their assets.

Hedge economy

In the first simulation of a hedge economy, borrowers repay their loans from realised investment cash flows. Households pay for consumption from wages, and sell their investments (property) to re-pay their loans and close that part of the circuit. If households are hedging, their spending *across the sector* is less than wages. Deferred household spending (pensions) is the main source of investment funding across the business cycle. The typical behaviour of hedge businesses is to borrow and invest across the production cycle, helping to smooth aggregate, lifetime consumption.

¹⁷ Banking practices such as securitisation, M&A and private equity buyouts will lock-in 'capital gain-like' revenues before the loan matures (Levina, 2014). Under this classification, these are Ponzi forms of financing if the market price is higher than the realised cashflow to maturity.

Hedge businesses invest in productive assets, pay wages and buy goods and services from other businesses. The aggregate consumption of businesses is zero, and the business circuit is closed when household consumption ceases (so all goods and services have been sold). The household circuit closes when households repay their loans.

In this simulation, hedge banks do not invest directly in financial assets. They simply maintain a reserve ratio, create loans, receive loan interest, divert any excess into bank spending and 'close the circuit' when loans are fully repaid:

Transaction	Banks		Households		Businesses		Σ
	Current	Capital	Current	Loan	Current	Loan	
Create loan	$-\Delta res$	$+\Delta res$	$-\Delta a$	$+\Delta a$	$-\Delta a$	$+\Delta a$	0
Loan payment	$+2\Delta a \cdot r_L$		$-\Delta a \cdot r_L$		$-\Delta a \cdot r_L$		0
Wages			$+\Delta a \cdot w_r$		$-\Delta a \cdot w_r$		0
Spending	$-\Delta a \cdot bs_r$		$-\Delta a \cdot hs_r$		$+\Delta a \cdot hs_r + \Delta a \cdot bs_r$		0
Repay principal	$+\Delta res$	$-\Delta res$	$+\Delta a$	$-\Delta a$	$+\Delta a$	$-\Delta a$	0
Σ	0	0	0	0	0	0	0

Table 7.2: Hedge Model

Where Δres = reserves, $-\Delta a$ = loans, r_L = interest rate on loans, w_r = wage rate (the ratio of wages: business loans), hs_r = household spending rate (the ratio of household spending to household loans), bs_r = bank spending rate (the ratio of bank spending to loans).

In the equations that follow, households and businesses are shown borrowing the same *initial finance* ($-\Delta a$). Later, the ratio of household to business loans is discussed, but this simplifying assumption means the equations can be simplified.

In the tradition of Godley and Lavoie, all of the rows and columns sum to zero. As a consequence, one of the equations can be treated as redundant. Giving this treatment to spending gives insight into the behaviour of banks and households, as follows:

Transaction	Banks		Households		Businesses		Σ
	Current	Capital	Current	Loan	Current	Loan	
Create loan	$-\Delta res$	$+\Delta res$	$-\Delta a$	$+\Delta a$	$-\Delta a$	$+\Delta a$	0
Loan payment	$+2\Delta a \cdot r_L$		$-\Delta a \cdot r_L$		$-\Delta a \cdot r_L$		0
Wages			$+\Delta a \cdot w_r$		$-\Delta a \cdot w_r$		0
Spending	$-2\Delta a \cdot r_L$		$-\Delta a \cdot (w_r - r_L)$		$+\Delta a \cdot (w_r + r_L)$		0
Repay principal	$+\Delta res$	$-\Delta res$	$+\Delta a$	$-\Delta a$	$+\Delta a$	$-\Delta a$	0
Σ	0	0	0	0	0	0	0

Table 7.3: *Spending in Hedge Model*

Provided households and businesses meet their loan repayment schedules, banks sustain their spending from loan interest. In a model where inflation is constant across all stocks and flows (including $(-\Delta a)$) households and businesses do not make investment gains and the hedge model has no investment or inflation risk.

In fact, there is no need for banks to hold reserves, provided bank spending remains within the limits set by the circuit and spend an amount less than or equal to their interest income, namely:

Equation 7.1: *Bank spending* $(bs_r) = 2\Delta a \cdot r_L$

As the interest rate on loans (r_L) approaches zero, bank spending also approaches zero.

On the other hand, since

Equation 7.2: *Household spending* $(hs_r) = \Delta a \cdot (w_r - r_L)$

As the interest rate on loans (r_L) approaches zero, households can increase their share of total spending: the model makes no distinction between whether they increase immediate or deferred spending, although wages (w_r) are the bigger term in **Equation 7.2**. In general, banks prefer higher interest rates (to increase their share of spending) whereas households prefer lower interest rates and higher wages.

In practice, the interest rate is influenced by central bank policy (the central bank rate (cb_r)). As the central bank rate rises, some businesses, households and governments will be less able to repay their loans. Banks can recoup some of their capital losses by selling the assets of defaulting firms or businesses, but they cannot recoup missed interest payments: hence, as the default rate (dr_L) increases bank spending reduces (**Equation 7.3**). Lastly, households and businesses can extend their loans rather than default: as the duration of loans (d_L) increases, bank spending also reduces:

Equation 7.3: *Bank spending* $= 2\Delta a \cdot r_L = f\left(\frac{cb_r(1-dr_L)}{d_L}\right)$

Since inflation rates will vary across different stocks and flows, the model is an oversimplification. If asset price inflation is zero and wages are spent, loans get repaid and the circuit closes. With asset price deflation, loan payments increase in proportion to loans and banks' share of spending increase, unless interest rates are dropped. With asset price inflation, banks need to ensure they increase lending (Δa) to maintain their share of spending: with hyperinflation in asset prices, banks cannot keep up; with hyperinflation in goods prices, wages cannot keep up. Assuming *inflation affects all stocks and flows equally* the effects can also be mitigated by changing loan durations (d_L) where loans never get repaid under hyperinflation, or are repaid more quickly under deflation:

Equation 7.4: hyperinflation: $d_L \rightarrow \infty$

Equation 7.5: deflation: $d_L \rightarrow 0$

This is a fairly dry exercise in algebra, but it suggests an alternative to interest rate policy is to adjust loan durations, with shorter duration loans as a response to inflationary pressures and longer duration loans (such as government perpetuities) as a response to deflationary pressures.

The equations for household and bank spending create algebraic upper and lower bound where i) the central bank rate (cb_r) must be greater than 0 per cent for bank spending to be positive ii) the loan payment rate (r_L) must be less than the wage rate (w_r) for household spending to be positive. There is also a living wage (w_{lv}) below which household spending cannot drop, or households are driven to speculative and Ponzi behaviour:

Equation 7.6: $w_r > (w_{lv} + r_L)$

The model has two other interesting features. Businesses, if they seek to increase total spending, are split between raising wages, and a preference for higher interest rates, since:

Equation 7.7: *Total spending* = $\Delta a \cdot (w_r + r_L)$

This is because higher interest rates (r_L) increase bank spending, but exert downward pressure on wages because loan payments by businesses increase.

Both businesses and households prefer an increase in lending to businesses. This is illustrated by separating household and business loans in the spending formulae, as follows:

Transaction	Banks	Households	Businesses	Σ
Spending	$-\Delta a_h \cdot r_L$ $-\Delta a_b \cdot r_L$	$-\Delta a_b \cdot w_r + \Delta a_h \cdot r_L$	$+\Delta a_b (w_r + r_L)$	0

Table 7.4: Preferences in Hedge Model

Where $a_h = \text{household lending}$ and $a_b = \text{business lending}$.

An increase in lending to households (Δa_h) reduces household consumption spending, but has no impact on total spending because of the higher loan payments and bank spending. So it is only banks that prefer an increase in household lending.

In summary:

		Banks	Households	Businesses
Loan payment rate	Central bank rate (cb_r)	Higher	Lower	Split between higher loan payment rates to raise bank spending, and lower to raise household spending
	Loan duration (dr_L) and inflation	Lower	Higher	
	Repayment default rate (dr_L)	Lower	Higher	
Ratio of household to business loans		Prefer both to rise	Prefer higher business loans, and lower household loans	Prefer higher business loans

Table 7.5: Preferences by Sector

The hedge economy model shows that the central bank rate and ratio of household to business loans are not politically neutral. Hedge banks prefer higher interest rates to increase their share of spending. Hedge households prefer lower interest rates to minimise their borrowing costs. Businesses are split. Lower interest rates mean they can pay higher wages to boost household spending, but higher rates also mean higher bank spending.

A stable hedge economy might have occupational pensions, stable healthcare, wages and demographics, consistent inflation, and good banking regulation (with steady default rates and loan durations). To close the business circuit, external spending would need to be neutral or negative across the full productive cycle. With these characteristics, a hedge economy could sustain a wide range of central bank rates, ***including a stable, high interest rate economy*** should the household sector have less political influence than the banks.

The model also suggests that credit easing/rationing and wage policies are useful macroeconomic tools. The wage rate (w_r) will clearly vary between different economies and sectors. A capital-intensive sector or economy might have a lower wage rate and vice-versa.

Of course, loans are not simply extended to invest in production and property: the next section introduces lending to speculate on existing assets.

Speculative economy

In this speculative economy model, loans are invested in real and financial assets. Following the definition given by Minsky, speculative households do not spend investment gains until they have been realised. Households continue to make loan payments and to fund spending from wages, but they also roll over their loans regularly by selling their assets and spending the realised investment gains. This revision allows borrowers to speculate on their financial and capital accounts. Investment gains (r_1 and r_2) can be positive or negative, and investment gains make

no distinction between capital gains (losses) from asset price inflation; investment returns such as dividends on equities; coupon payments on bonds; or interest on deposit accounts.

Speculative businesses also use loans to buy financial assets, such as other businesses in their supply chain. They use their productive investments to produce goods and services, and pay wages and loans, but they also buy and sell financial assets and spend realised investment gains.

Transaction	Banks		Households		Businesses		Σ
	Current	Capital	Current	Investment	Current	Investment	
Create loan	$-\Delta res$	$+\Delta res$	$-\Delta a$	$+\Delta a$	$-\Delta a$	$+\Delta a$	0
Loan payment	$+2\Delta a. r_L$		$-\Delta a. r_L$		$-\Delta a. r_L$		0
Investment gain		$-\Delta a. (r_1 + r_2)$		$+\Delta a. r_1$		$+\Delta a. r_2$	0
Wages			$+\Delta a. w_r$		$-\Delta a. w_r$		0
Re-finance	$-\Delta a. (r_1 + r_2)$	$+\Delta a. (r_1 + r_2)$	$+\Delta a. r_1$	$-\Delta a. r_1$	$-\Delta a. r_2$	$-\Delta a. r_2$	0
Spending	$-\Delta a. bs_r$		$-\Delta a. hs_r$		$+\Delta a. hs_r + \Delta a. bs_r$		0
Repay principal	$+\Delta res$	$-\Delta res$	$+\Delta a$	$-\Delta a$	$+\Delta a$	$-\Delta a$	0
Σ	0	0	0	0	0	0	0

Table 7.6: *Speculative Model*

Since we are interested in spending, that row is treated as the redundant equation.

Transaction	Banks		Households		Businesses		Σ
	Current	Capital	Current	Investment	Current	Investment	
Create loan	$-\Delta res$	$+\Delta res$	$-\Delta a$	$+\Delta a$	$-\Delta a$	$+\Delta a$	0
Loan payment	$+2\Delta a. r_L$		$-\Delta a. r_L$		$-\Delta a. r_L$		0
Investment gain		$-\Delta a. (r_1 + r_2)$		$+\Delta a. r_1$		$+\Delta a. r_2$	0
Wages			$+\Delta a. w_r$		$-\Delta a. w_r$		0
Re-finance	$-\Delta a. (r_1 + r_2)$	$+\Delta a. (r_1 + r_2)$	$+\Delta a. r_1$	$-\Delta a. r_1$	$+\Delta a. r_2$	$-\Delta a. r_2$	0
Spending	$-\Delta a. (2r_L - r_1 - r_2)$		$-\Delta a. (w_r - r_L + r_1)$		$+\Delta a. (w_r + r_L - r_2)$		0
Repay principal	$+\Delta res$	$-\Delta res$	$+\Delta a$	$-\Delta a$	$+\Delta a$	$-\Delta a$	0
Σ	0	0	0	0	0	0	0

Table 7.7: Spending in Speculative Model

With speculative households and businesses, a number of survival constraints become apparent.

The interest rate (r_L) at which the banking sector does not become illiquid is now related to the loan size (Δa) and investment gains (r_1) in all investment markets:

Equation 7.8: $\sum_1^n \Delta a_n. r_L > \sum (a_1 r_1 + a_2 r_2 + a_3 r_3 + \dots a_n r_n) / n$

In the simple example above, where households and businesses borrow the same amount:

Equation 7.9: $Bank\ spending = f\left(\frac{cb_r(1-dr_L)}{d_L} - \frac{(r_1+r_2)}{2}\right)$

As before, speculative banks are likely to prefer higher central bank rates, lower loan defaults and shorter loan durations. Additionally, speculative banks will prefer lower investment gains to households and firms (r_1 and r_2) because those gains reduce the banks' share of total spending. Alternatively, banks can lobby to invest in markets where they expect to achieve investment gains that are higher than their cost of borrowing. This dual nature of banks in the model is especially interesting: when other sectors are cautious (hedging) they benefit from their retail business and prefer higher interest rates; but when other sectors are speculating or Ponzi, they benefit more from their investment business and prefer lower interest rates. Without separation of retail and investment banks, they have private information on capital flows to (and from) financial assets, and can benefit whatever the behaviour in the broader economy due to their dual nature.

Speculative banks still need to defer spending to ensure they have enough capital to pay realised gains to households and businesses. In other words, banks need to hold suitable levels of reserves, or they will face a liquidity crunch. Businesses and households also need to defer some spending until they have realised investment gains. If they do not, some businesses and households will become insolvent.

Transaction	Banks	Households	Businesses	Σ
Spending	$-\Delta a_h \cdot (r_L - r_1)$ $-\Delta a_b \cdot (r_L - r_2)$	$-\Delta a_b \cdot w_r + \Delta a_h \cdot (r_L - r_1)$	$+\Delta a_b (w_r + r_L - r_2)$	0

Table 7.8: Preferences in Speculative Model

Where

$a_h =$ household lending, $a_b =$ business lending, $r_1 =$ return on household investments and $r_2 =$ return on business investments.

The effect of speculation is therefore i) a reduction (or deferment) of spending until investment gains are realised, ii) the possibility of zero or negative bank spending, with banks that are precariously liquid/illiquid (**Equation 7.8**), or iii) the more plausible possibility that speculation increases liquidity problems, which the central bank responds to by lowering rates, leading to further speculation.

Households continue to prefer an increase in w_r , a reduction in r_L , and a reduction in Δa_h . Banks prefer an increase in r_L and all loans. As before, households and businesses share a preference for higher business lending (Δa_b) because, in the model, this means higher wages. There are three main differences from the hedge economy, however:

- 1) Banks lobby to invest in markets, where they expect to achieve investment gains that are higher than their cost of borrowing
- 2) Banks prefer to lend in sectors where returns are low, and to invest in sectors where returns are high
- 3) Compared to the hedge model, total spending is *reduced* by $\Delta a_b \cdot r_2$. In other words, the retention of capital gains by businesses will dampen total spending

Ponzi economy

In the third model, sectors do not wait until they have sold their assets before spending their gains. If households are spending more than they receive in wages, then spending is being supported by unrealised investment gains (so the house or pension assets have not been sold): the model defines this as Ponzi household spending. In practice, this Ponzi spending is both voluntary (households who cash in on investment gains without selling assets) and involuntary (household forced to borrow on credit cards, to miss mortgage payments or run up an overdraft, to avoid their spending dropping below the living wage constraint (**Equation 7.6**)).

Ponzi businesses increase borrowing on the strength of unrealised investment gains. In practice, the lines between current, loan and investment accounts are blurred, but the important factors are that unlike loan interest, investment gains are unpredictable and not contractual. Ponzi businesses might use loans to invest in financial assets and, if they can continue to roll over loans, the bubble continues to grow. Instead, Ponzi investors will increase loans on the strength of unrealised gains, with techniques such as marking-to-market.

For simplicity, the model assumes two extremes with a defined relationship between r_1, r_2 and r_L . These are:

Equation 7.10: *Bubble formation, where $\frac{r_1+r_2}{2} > r_L$*

Equation 7.11: *Bubble collapse, where $\frac{r_1+r_2}{2} < r_L$*

If we define x_1, x_2 as excess gain/loss then

Equation 7.12: *Household investment gain (r_1) = $r_L + x_1$*

Equation 7.13: *Business investment gain (r_2) = $r_L + x_2$*

For simplicity, x_1, x_2 are either positive or negative across all markets.

Transaction	Banks		Households		Businesses		Σ
	Current	Capital	Current	Investment	Current	Investment	
Create loan	$-\Delta res$	$+\Delta res$	$-\Delta a$	$+\Delta a$	$-\Delta a$	$+\Delta a$	0
Loan payment	$+2\Delta a. r_L$		$-\Delta a. r_L$		$-\Delta a. r_L$		0
Investment gain	$-\Delta a. (2r_L + x_1 + x_2)$		$+\Delta a. (r_L + x_1)$		$+\Delta a. (r_L + x_2)$		0
Wages			$+\Delta a. w_r$		$-\Delta a. w_r$		0
Spending	$-\Delta a. bs_r$		$-\Delta a. hs_r$		$+\Delta a. hs_r$ $+\Delta a. bs_r$		0
Σ	$-\Delta res$	$-\Delta a. (2r_L + x_1 + x_2)$	$-\Delta a$	$-\Delta a. (r_L + x_1)$	$-\Delta a$	$-\Delta a. (r_L + x_2)$	0

Table 7.9: Ponzi Model

Technically, banks' solvency now relies on their ability to increase their reserves through capital gains. If banks, businesses and household spend their unrealised gains the accounting relationships breakdown. The circuit never closes and bank capital varies according to investment returns and interest rates:

Equation 7.14: $\Delta a. (2r_L + x_1 + x_2)$

Banks can continue to lend provided they remain liquid and solvent, which includes the new constraint that:

Equation 7.15: $\Delta res > \Delta a. (2r_L + x_1 + x_2)$

Since Δres is largely comprised of government debt then, provided banks can get new reserves, the Ponzi circuit is perfectly plausible. Bank behaviour is a balance between increasing Δres , lobbying for lower interest rates so they can speculate; or lobbying for

higher interest rates so they can earn profits on their retail business. Hence, with speculative and Ponzi behaviour, a preference for **low interest rates** emerges.

Since we are interested in bank spending, this is treated as the redundant equation.

Transaction	Banks	Households	Businesses	Σ
Spending	$+\Delta a_h \cdot x_1 + \Delta a_b \cdot x_2$	$-\Delta a_b \cdot w_r - \Delta a_h \cdot x_1$	$+\Delta a_b \cdot w_r - \Delta a_b \cdot x_2$	0

Table 7.10: Preferences in Ponzi Model

For there to be any bank spending (where banks themselves are not speculative or Ponzi):

Equation 7.16: $\Delta a_h \cdot x_1 + \Delta a_b \cdot x_2 < 0$

As in the speculative economy, banks prefer to invest in markets where excess gains (x_1, x_2) are positive, and to lend in markets where excess gains (x_1, x_2) are negative.

During bubble formation, bank reserves are run down (**Equation 7.15**). During bubble collapse, if households do not increase spending above wages (**Equation 7.10**) the business circuit does not close. Without debt-fuelled household spending, businesses are unable to meet their loan and wage obligations. Paradoxically, banks are able to spend and rebuild reserves during systemic crises. In summary, a low interest rate economy emerges, where banks speculate, run down their reserves during bubble formation, and rebuild their balance sheets during systemic crises.

Simulations

The following sections estimate parameters for the hedge economy model, and then simulate a range of bailout tests as per Keen (Keen, 2010) with the addition of a Keynesian boost.

The model parameters are estimated as follows:

- i. Δa_s (total bank reserves). For the sake of convention, bank reserves are set at 10 per cent, although in a hedge economy reserves are not necessary.
- ii. $\Delta a_1/\Delta a_2$ (the ratio of household loans to business loans). A single loan payment rate (r_L) is used with $\Delta a_1 = \Delta a_2$, as above. The actual ratio of household to business loans is estimated and discussed (below).
- iii. Taxes. To model the government sector, the model would benefit from adding taxes to both flows and stocks. This exercise is considered in **Chapter Eight**. It is important to note that in the UK and US, liability (loan) flows have some of the lowest tax rates, and different tax rates will distort any equilibria.
- iv. r_L (interest rate). This is a function of the central bank rate (cb_r), loan duration (dr_L) and repayment default rate (dr_L). Although UK and US household mortgages tend to be long duration, banks were increasingly using securitisation to originate and distribute. In the simulations, a loan payment rate of four per cent is used. This is close to the average UK and US central bank rate (1970-2010). It is also the rate at which a principal is repaid over 25 years in a hedge model without inflation.
- v. w_r (ratio of annual wages to business loans). This figure is estimated using real data for the UK and US (below). To simulate 'sticky' wages, the model tests what happens if wages do not decline below their initial value.
- vi. hs_r (household spending). Since these are hedge economy simulations, household spending equals residual wages after loan payments. In speculative and Ponzi economies, households would also spend investment gains.
- vii. bs_r (bank spending). Hedge banks spend income in excess of reserve requirements. This is a broad definition of bank spending, including capital flows into business investments (equities and corporate debt). Bank spending includes the investment of loan income surpluses.

Estimates of the wage rate (w_r), and the household to business loans ratio ($\Delta a_1/\Delta a_2$), follow. For the US, data are taken from the Federal Reserve and U.S. Bureau of Economic Analysis. Three values are used, i) wage and salary disbursements ii) household and non-profit liabilities and ii) non-financial business liabilities.

From the early 1980s, there is a marked decoupling of household loans from wages in the US.

This is similar to the decoupling of financial and non-financial wages (Financial Crisis Inquiry Commission, 2011, p. 62). This alternative graph has other nuances, namely i) a 'heart attack' in 1973-4 that corresponds to the collapse of Bretton Woods ii) an accelerated decoupling in the US after the repeal of Glass-Steagall.

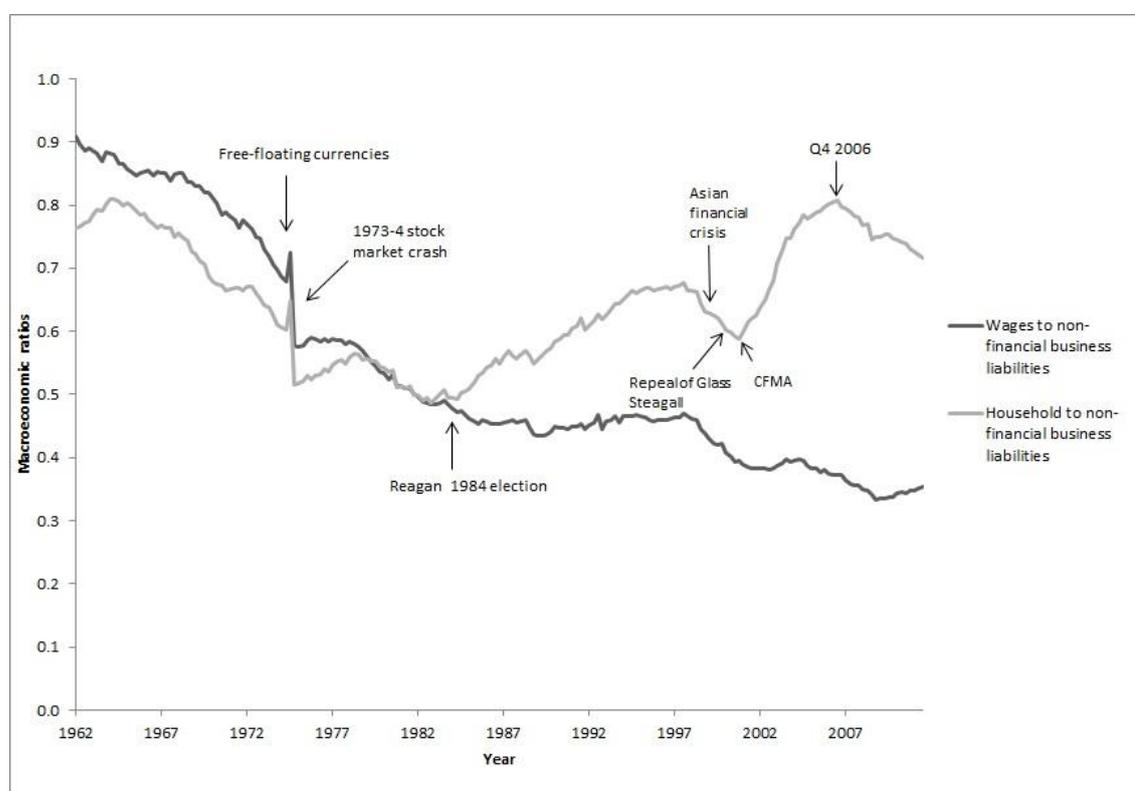


Figure 7.1: US ratio of wages and household debt to non-financial business liabilities (Source: US Bureau of Economic Analysis, Federal Reserve).

These results show that, after the repeal of Glass-Steagall, household lending increased and business lending decreased. There are several possible explanations for this. New practices to originate and distribute household loans would reduce the perception of their default risk (dr_L). At the same time, increased business investment outside the US might increase the perception of business default risk (dr_L) in the US,

or suggest that intervention is needed to encourage longer duration (d_L) business investment.

For the UK, the Office for National Statistics does not provide data prior to 1987, nor do they provide monthly figures. The equivalent figures used are i) real households disposable income ii) liabilities of households and non-profit institutions serving households and iii) liabilities of non-financial corporations.

The UK wage rate also declines, and relative household loans increase from 1998-2008. Consistent with the idea that there is no ‘one-size-fits-all’ economic model, UK household lending peaked later than the US, and there was a marked decline in business lending around the Asian financial crisis (1998).

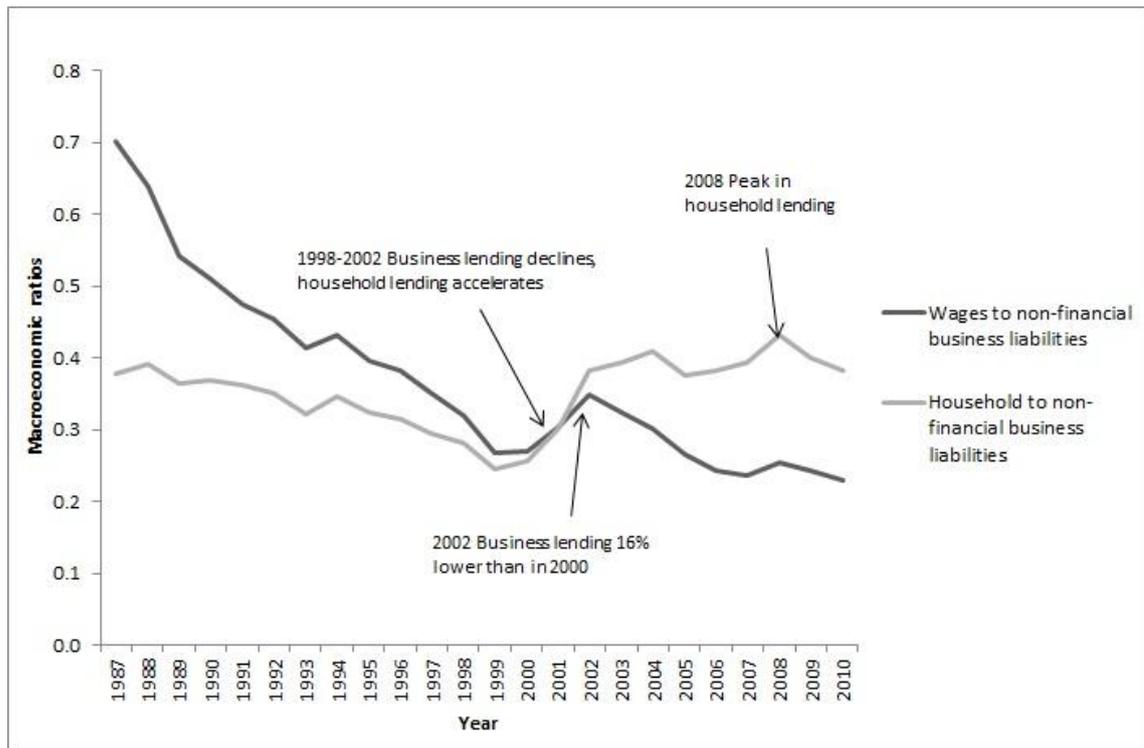


Figure 7.2: UK ratio of wages (non-disposable income) and household debt to non-financial business liabilities (Source: Office for National Statistics).

The UK graph is consistent with a structural break in FDI flows around 1997-8, which Ferreiro et al. attributed to a ‘worldwide relocation of production of tradable goods’ that ‘is a structural-nature process that cannot be solved with short-term measures like exchange rate adjustments or macroeconomic (fiscal-monetary) policies’ (Ferreiro et al. 2012, p. 33).

The following simulations ask what happens if i) banks are bailed out ii) households are bailed out or iii) there is an increase in business investment (loans)? In each simulation, bailout money is spent at the rate of 25 per cent per year.

Parameter	Description	Value
Δres	Total bank reserves	20
Δa_1	Total loans to households	100
Δa_2	Total loans to businesses	100
w_r	Annual wages/business loans	25%
r_L	Bank loan rate	4%
$\Delta a_1 : \Delta a_2$	Long-run equilibrium of business to household loans	1

Table 7.11: Parameters for Bailout Simulations

To model a bank bailout, Δres is increased by 50 (to 70). If banks do not run down reserves, there is no impact.

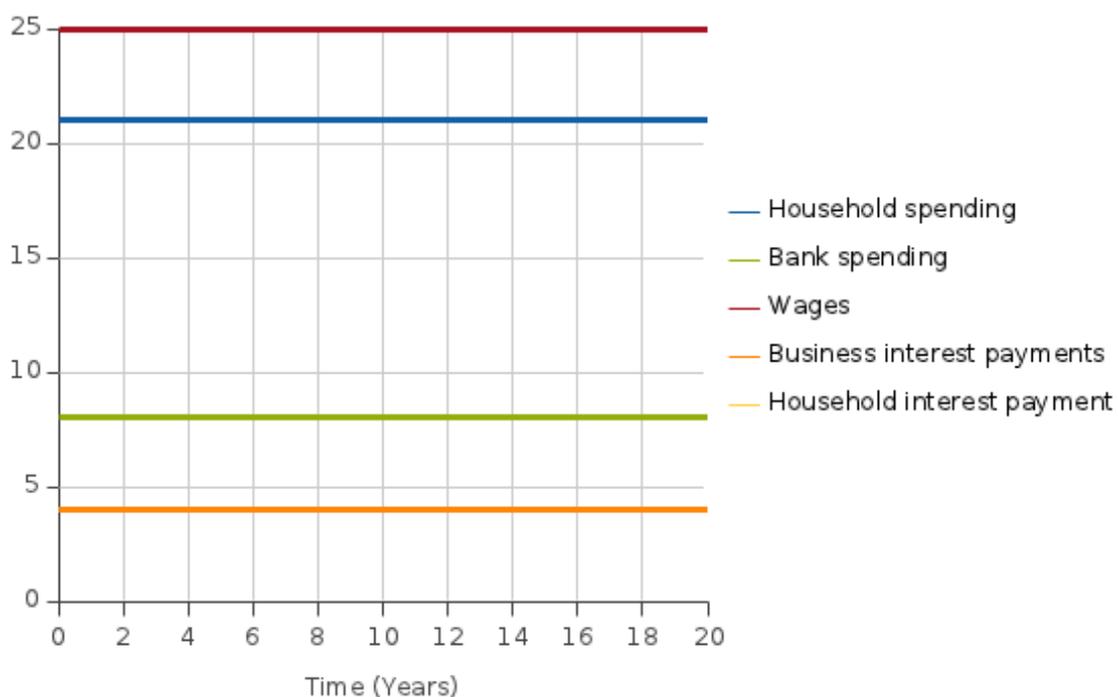


Figure 7.3: Bank Bailouts with no increase in bank spending

If banks follow a reserve ratio rule, and spend 25 per cent of any excess reserves (with a 10 per cent reserve requirement) the result is a boost to bank spending. If businesses use this extra bank spending to pay down debt, rather than to raise wages, the result is a period of household austerity and higher inequality. Total spending recovers because households pay down their debt and increase spending, to which businesses respond by re-leveraging.

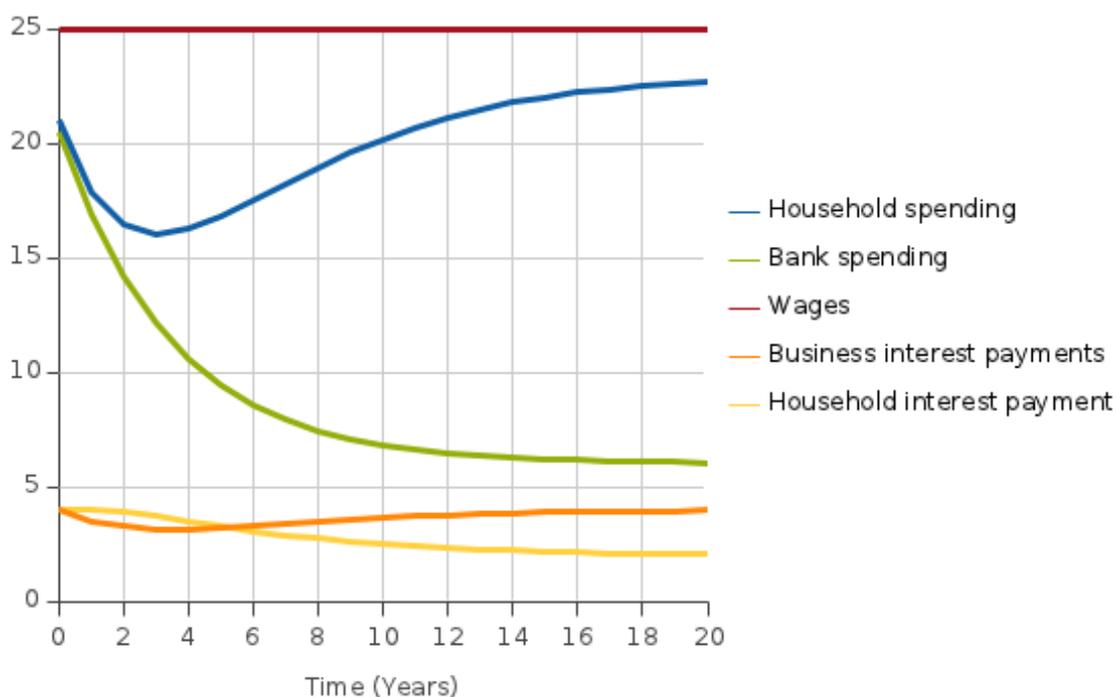


Figure 7.4: Bank Bailouts with Bank Reserves Rule and ‘Sticky’ Wages

To model the injection of capital in the household sector, Δa_1 is reduced by 50 (capital is injected at a rate of 25 per cent of the remainder each year, to match the bank bailout simulations). Since households spend their wages, less any loan payments, the result is a reduction in bank spending and an increase in household spending. There is no downward pressure on wages:

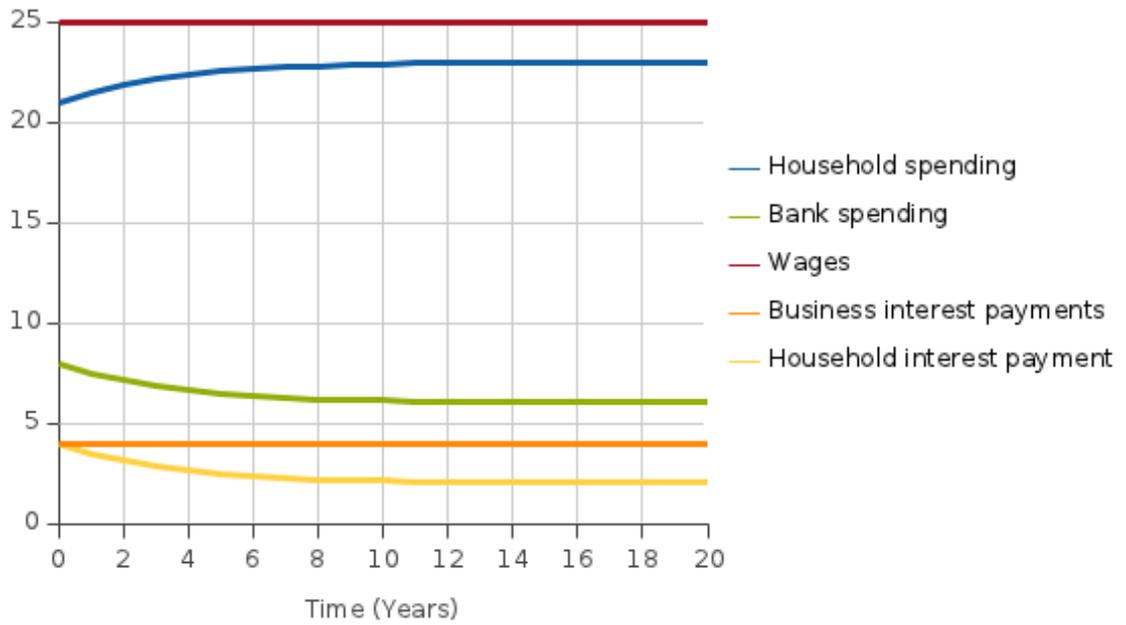


Figure 7.5: Household Bailouts

Finally, business loans Δa_2 are increased by 50. To match the household and bank bailouts, the increased lending is at the rate of 25 per cent of the remainder each year. The result is a boost to business investment and household spending (via wages), which suggests it could be inflationary.

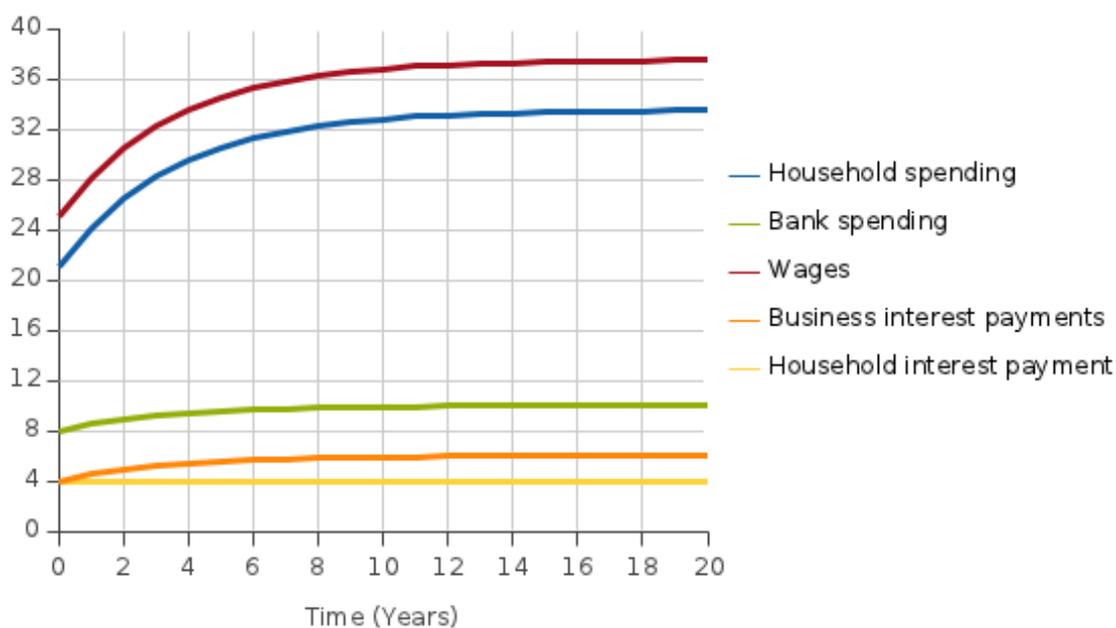


Figure 7.6: *A Keynesian Boost*

These results are consistent with Keen. Bailing out the banks with public money boosts bank spending, not the economy, and has the unfortunate consequence that there is downward pressure on wages and household spending. Bailing out hedge households diverts household flows from loan payments to spending. Boosting business loans, provided the wage rate increases, also boosts household spending.

Which policy is the most appropriate would depend on policy objectives: bailing out hedge households might favour consumption and boosting business loans would favour production. These interpretations are consistent with suggestions that aggregate demand is wage led (Arnim et al. 2012, p. 11); and that income inequality and private lending are casual factors in rising current account deficits (Kumhof et al., 2012): there is a short-term boom from private lending but that is followed by 'ultimately lower consumption in the long run' (Kumhof et al., 2012, p. 26).

Conclusions

Using accounting techniques in macroeconomics offers valuable insights. The co-existence of a stable, high interest rate economy and an unstable, low interest rate economy seems possible. In a high interest rate economy, where borrowers repay their loans from realised investment cashflows, banks earn large profits from their retail businesses. In a low interest rate economy, bank profits are squeezed and they lobby to enter investment markets. Since the preferences and profits of retail and investment banks are so different, it makes sense to separate them. After the repeal of Glass Steagall and the Commodity Futures Modernization Act in the US, bank lending to households increased sharply: in the model, increased household lending would follow if banks perceived household default risks to be less than business default risks.

The central bank rate is not neutral in these models. Households prefer lower interest rates, longer duration loans and higher asset price inflation; retail banks that are hedging prefer the opposite; and investment banks prefer lower interest rates to increase their profits from speculation. Other factors (the wage rate, ratio of household to business loans, loan defaults, taxes and government spending) can alter the path taken by stocks and flows in this model.

Whether or not the central bank needs to intervene with liquidity depends on the financing decision. In the speculative model, where all sectors spend their realised investment gains, banks are competing with businesses and households for a share of investment gains: if banks over-spend, their reserves fall and they face solvency issues. However, if they reduce lending and revert to hedging behaviour, banks recover during crises because debt has precedence over equity during bankruptcies.

With Ponzi spending, where each sector has solvency issues, banks completely run out of reserves during crises. The ex-post solutions are bank failure or the creation of new reserves ex nihilo (via QE); the ex-ante solution is to prevent banks from spending their unrealised investment gains, and to remove all central bank support for investment banks and speculation in investment markets. Other ex-ante solutions include a

crackdown on mark-to-market and fair value accounting, and restrictions on originate and distribute models in retail banking, on the assumption that banking profits are not realised until loans are fully paid-up.

In this simple model, the impact of inflation is not fully investigated. However, low inflation increases banks' share of spending in the hedge economy, and has the same impact as reducing the loan duration and demanding earlier repayment of the principal. This suggests that adjusting loan durations might be an alternative to interest rate policy: making longer duration loans (such as government perpetuities) when asset price rises are low, and making shorter duration loans when asset price rises are high. Shorter duration loans will have a similar effect to imposing strict lending criteria when asset prices are rising.

The paradox of a Ponzi economy is that, when asset prices collapse, hedging banks can increase their share of spending. Bank solvency is a balance between i) making speculative profits on a wide range of carry trades, borrowing cheaply to earn investment gains ii) running down reserves during bubble formation iii) rebuilding reserves during systemic crises.

The simulations suggests that a Keen-type bailout to 'go early, go hard, go households' is a simple way to support spending. A Keynesian boost to business investment (loans) is also effective, provided businesses increase wages. The choice between a Keen-type bailout and Keynesian boost might depend on the trade balance. To reduce imports, a Keynesian boost would be preferable because of the impact on production, with the household sector benefitting through wage rises. If exports are strong, then a Keen-type bailout (such as tax cuts) would increase household spending and reduce the trade surplus. Bank bailouts are the least effective intervention, and in the simulation lead to a period of austerity (because businesses pay down their loans) and inequality (because bank spending increases). In the model, household spending recovers slowly because they pay down their loans from wages, which stimulates further business investment and higher wages.

CHAPTER 8: Accounting for financialisation

Introduction

Chapter Seven introduced a model to explain the carry trade in terms of the financing decision. In a hedge economy, where households and businesses did not spend unrealised investment gains, retail banks earned large profits from high interest rates. With a move towards speculative and Ponzi finance, all sectors relied on accommodative behaviour by the central bank during systemic crises to prop up asset prices and minimise insolvencies: interest rates fell. If banks can also earn profits from speculation when interest rates are low, they can avoid insolvency by trading short-term derivatives, moving illiquid assets off balance-sheet and relying on the priority given to debt during bankruptcy. Adjustment costs then fall on the government, households, businesses and foreign sector.

This Chapter outlines three further explanations for persistent carry trades. The first model shows how the Washington Consensus promoted high interest rates and yields in export-led economies: in the model, one country (BanksCountry) provides financial services to a second (GoodsCountry). The second explanation shows how leverage diverts profits to the financial sector, which weakens demand and leads to low interest rates under inflation targeting. Shadow banks thrive where there are persistent trade deficits that are being recycled offshore. Trading in money-like instruments means there is no shortage of collateral or reserves for speculation and banking. The third model shows how financialisation and the privatisation of services create growth but can undermine the government's share of GDP. These three models suggest multiple behavioural explanations for the carry trade.

Washington Consensus model

This section uses a stock-flow-consistent model to analyse the Washington Consensus (Williamson, 1990). There are three circuits: banks lend to households and businesses, as in **Chapter Seven**, but they also lend to domestic and foreign governments. Households and businesses face liquidity and solvency constraints because 'in the real world many economic agents are liquidity constrained' (Arestis 2009, p. 11); governments that borrow in foreign currency are also constrained. The domestic

government in BanksCountry has the support of an accommodative central bank so does not have liquidity constraints.

The seven key features described in **Chapter Four** apply: there cannot be any black holes; the model is not constrained by equilibrium; domestic savings do not need to equal investment; the domestic government does not need to run a balanced budget; behaviour is constrained by solvency and liquidity rather than expectations; money is not neutral; and the money supply is determined endogenously by the private sector.

There is also a set of market restraints... the *goods and services* market is in equilibrium when the difference between savings and investment is equal to the sum of the budget surplus and the trade balance deficit. The *capital* market is in equilibrium when foreigners and domestic banks are willing to accumulate the increase in net debt of the government and the public. The *foreign exchange market* is in equilibrium when the actual increase in reserves is equal to the rate (which may be positive or negative) at which the central bank wants to buy reserves. And the *money* market is in equilibrium when the community is willing to accumulate the increase in the money supply offered by the banking system. I shall assume that, initially, each market is in equilibrium.

(Mundell, 1963, p. 477).

Table 8.1 shows the Mundell model:

Sector	Goods and services	Financial assets	Money	International reserves	Σ
Government	$T - G$	Government borrowing	Government dishoarding		0
Private	$S - I$	Private borrowing	Private dishoarding		0
Foreign	$M - X$	Capital outflow		Increase in reserves	0
Banking		Open market sales	Monetary expansion	Foreign exchange sales	0
Σ	0	0	0	0	0

Table 8.1: Market equilibrium. Where $T =$ taxes, $G =$ government spending, $S =$ private spending, $I =$ private investment, $M =$ imports and $X =$ exports Source: (Mundell, 1963, p. 476).

According to Mundell, under these assumptions of equilibrium with full capital mobility 'all the complications associated with speculation, the forward market, and exchange rate margins are thereby assumed not to exist' (Mundell, 1963, p. 476). If the government were to run a deficit, 'this would increase the demand for money, raise interest rates, attract a capital inflow, and appreciate the exchange rate... fiscal policy thus completely loses its force as a domestic stabiliser' (Mundell, 1963, p. 478). Monetary policy takes precedence, as discussed in **Chapter Three**. The central bank is assumed to be in control, putting downward pressure on the interest rate and expanding the money supply by buying reserves. If the central bank buys foreign

reserves to sterilise trade surpluses this weakens the domestic currency, and if the central bank buys domestic reserves this leads to capital outflows in search of a higher yield.

In contrast, **Table 8.2** shows the same model where the money supply is determined endogenously by the financial decisions of the private sector, in particular bank lending, which in turn are based on (often private) information about the solvency and profitability of different sectors in domestic and foreign markets. Banks know 'who their most credit worthy customers are, but competing banks do not' (Joseph E Stiglitz and Weiss, 2013, p. 409). The primary concern of banks is the profitability of their loans, which depends on the interest spread, fees payable and the probability of default. As in **Chapter Seven**, households borrow to invest in property and firms borrow to invest in wages and the materials needed for production. Government spending is financed through taxes and government loans, and loan interest payments flow to the banking sector. Banks create new loans *ex nihilo* against their fractional reserves which are largely government bonds. When asset prices collapse, households and businesses face liquidity problems because banks make lending decisions based on the information they have about the solvency of each sector.

Table 8.2 shows the revised model. This is based on the speculative economy in **Table 7.6**. Households and firms take out new loans to capitalise investment gains, which banks supply on demand by a process of endogenous money creation:

Transaction	Banks		Households		Govt	Businesses		Σ
	Current	Capital	Current	Capital	Current	Current	Capital	
Create loan	$-\Delta res$	$+\Delta res$	$-I_h$	$+I_h$	$-I_g$	$-I_b$	$+I_b$	0
Loan payment	$+I \cdot r_L$		$-I_h \cdot r_L$		$-I_g \cdot r_L$	$-I_b \cdot r_L$		0
Realise investment gains ¹⁸	$-I \cdot r$	$+\Delta I$	$+I_h \cdot r_h$	$-\Delta I_h$	$+\Delta I_g$	$+I_b \cdot r_b$	$-\Delta I_b$	0
Wages			$+I_b \cdot w_r$			$-I_b \cdot w_r$		0
Taxes	$-T_{bk}$		$-T_h$		$+T$	$-T_b$		0
Spending	$-I \cdot r_L - \Delta I$ $+T_{bk} + I \cdot r$		$-I_b \cdot w_r - I_h \cdot r_h$ $+\Delta I_h + I_h \cdot r_L + T_h$		$-T$ $-\Delta I_g$ $+I_g \cdot r_L$	$-I_b \cdot r_b + T_b$ $+I_b \cdot r_L$ $+I_b \cdot w_r$ $+\Delta I_b$		X- M
Repay principal	$+\Delta res$	$-\Delta res$	$+I_h$	$-I_g$	$+I_g$	$+I_b$	$-I_b$	0

Table 8.2: Solvency constraints. Where I = investments (loans), I_b = business loans, I_h = household loans, r_L = interest rate, r = total return on investments, M = imports, X = exports, T = taxes, T_h = household taxes, T_{bk} = bank taxes, and T_b = business taxes, G = government spending, w_r = wage rate, Δres = bank reserves.

¹⁸ New loans *ex nihilo*

Even when governments run a balanced budget ($\Delta I_g = 0$) the realisation of investment gains means that equilibrium is a special case: the money supply expands (and contracts) endogenously with asset prices. How this new money is spent depends on the financing decisions of banks, households and businesses. One sector might be saving and another might be dis-saving (investing) at the same time, irrespective of the interest rate. This is consistent with the sectoral balances approach shown in **Chapter Four**, where private sector savings mirror the government balance and trade position.

However, each sector also has long-term solvency constraints. For the household sector, spending must be less than wages plus investment gains, minus household interest payments and household taxes. For periods, households can boost spending by taking out debt ($+\Delta I_h$) and reduce spending by deleveraging ($-\Delta I_h$). Similarly, the level of government spending depends on the financing decision, including whether the government is aiming for a balanced budget ($\Delta I_g = 0$) and the interest rate at which governments can borrow.

If domestic banks and households spend some of their income on imports, then the solvency of the business sector is impacted. The business sector might not be able to raise prices, in which case it must lobby for lower taxes, lower wages and lower interest rates (or risk bankruptcy). The solvency of the business sector improves if it can realise investment gains or is supported by deficit government spending and debt-fuelled household spending.

In other words, when the constraint for lending to equal saving is relaxed, the financing decision becomes a key factor. **Table 8.3** summarises the key policy preferences for each sector. As in **Table 7.5**, households prefer higher wages and lower interest rates; banks prefer higher interest rates and they extend loans to households; businesses prefer lower taxes and lower wages; and the solvency of businesses is improved by government deficit spending and lower interest rates:

Policy	Government	Households	Banks	Businesses
Monetary policy: interest rates	Lower rates		Higher rates to boost profits	Lower rates to improve solvency
Monetary policy: money supply	Expansionary during periods of stress	Expansionary to boost asset prices	Expansionary to boost spending and asset prices	
Fiscal policy	High taxes	Lower taxes for their sector		

Table 8.3: Policy Preferences

Expansionary monetary policy appears the most likely to achieve consensus, if the institutional arrangements to support domestic liquidity exist. Other policies are likely to be contested because they have different impacts depending on the sector and the financing decisions already taken. Hence expansionary monetary policy takes precedence for reasons of political expediency. Growth follows from debt-fuelled household spending on the back of 'real estate bubbles (which are) always a credit phenomenon' (Kindleberger and Aliber, 2011, p. 11); from the realisation of capital gains by businesses; from deficit spending by governments; and when banks spend their interest income and relax their reserve requirements.

When governments rely on foreign banks for lending (such as the ECB) this introduces a solvency constraint on government which undermines countercyclical deficit spending. Instead, the adjustment costs during crises are borne by households and businesses. This is illustrated by comparing the impact on spending when one country specialises in banking and financial services (BanksCountry) and another specialises in the production of tradable goods (GoodsCountry). The assumption is that businesses

can borrow and invest internationally, but there are restrictions on the mobility of people and some services are not easily traded (such as healthcare, childcare and retirement services).

Since GoodsCountry relies on BanksCountry to invest in plant, machinery and to pay labour costs, interest payments flow to foreign banks. If loans to GoodsCountry are denominated in foreign currency, this also makes GoodsCountry vulnerable to a fall in their domestic exchange rate. From **Table 8.4**, spending in GoodsCountry is vulnerable to exchange rate movements (where xr is the exchange rate):

Transaction	Foreign Banks	Households	Govt	Businesses	Σ
Spending	$-I \cdot r_L - \Delta I$ $+T_{bk} + I \cdot r$	$-I_b \cdot w_r + T_h$ $+ xr(I_h \cdot r_L + \Delta I_h$ $-I_h \cdot r_h)$	$-T$ $+ xr(I_g \cdot r_L$ $- \Delta I_g)$	$+ T_b + I_b \cdot w_r$ $+ xr(I_b \cdot r_L$ $+ \Delta I_b - I_b \cdot r_b)$	$X-$ M

Table 8.4. GoodsCountry: solvency constraints with foreign borrowing.

GoodsCountry has given up monetary sovereignty by borrowing in a foreign currency, and is dependent on monetary policy in BanksCountry. A trade surplus gives GoodsCountry policy space, but if the trade position worsens or interest rates rise, this puts pressure on GoodsCountry because interest payments flow to foreign banks. With foreign currency loans, the Washington Consensus emerges as a short-term solution to solvency issues in the surplus country: if domestic wages are lower, profits will rise; if the exchange rate is competitive, exports will grow; and if government spending is reduced there is a lower tax burden on businesses and households. Investment inflows will then resume as FDI in search of higher yields.

However, BanksCountry has no foreign currency risk and retains monetary independence. Higher interest rates (**Table 8.3**) will benefit the banking sector and are an apparent solution to stress in the banking sector, despite their negative impact on

households and businesses. The Washington Consensus emerges as a series of policies that benefit the financial sector in BanksCountry. From the perspective of GoodsCountry, the solution is to develop a capability in banking and finance, to offer loans in domestic currency to government, businesses and households. This is consistent with the development alternative described in **Chapter Two**.

Shadow banking model

The Washington Consensus model shows how profits can be made from lending to the foreign sector at high interest rates. This kind of predatory lending was also discussed in **Chapter One**, when higher US interest rates resulted in a wave of financial crises in debtor countries followed by 'a second wave of private capital inflows to the emerging markets' (Vasudevan, 2009, p. 297). The next model shows how a deficit country like the US can meet private and foreign demand for loans, and support leveraged speculation in private equity and bonds. The solution to this dilemma is the growth of shadow banks, which recycle trade deficits as reserves that form the basis for offshore lending.

The Net Wealth for each sector is a combination of capital asset, property, equities and bond claims. Household borrowing is largely in the form of mortgages taken out with retail banks and secured against property; business borrowing is in the form of bank loans, bonds and equities that in turn are bought by households (out of wages) and by leveraged investors (including shadow banks); banks and shadow banks borrow in short-term money markets with a backstop from the central bank as lender of last resort.

Household sector borrowing did rise prior to the GFC, particularly in the US where household debt to total assets approached twenty per cent (Bank for International Settlements, 2009, p. 3). However, leverage in these sectors was dwarfed by financial sector leverage, with the World Top 50 banks having leverage at a level where total assets were about thirty times equity (Bank for International Settlements, 2009, p. 4). These figures for banks exclude the impact of trading, derivatives positions, embedded leverage in structured credit products and other 'short-term funding of off-balance sheet vehicles' (Bank for International Settlements, 2009, p. 7). Off balance sheet

operations allow banks to realise discounted future cash-flows which are consistent with the speculative financing decision in **Table 7.7**. If the loans are retained on the balance sheet at fair value or amortised cost and the valuation is too high, the balance sheet operations are consistent with the Ponzi financing decision shown in **Table 7.9** where unrealised income is spent or distributed as profit.

With central banks as lenders of last resort, there is no shortage of funding but a 'serious overcrowding of lenders' (Koo 2013, p. 20). The integration of retail and investment banks creates an environment where poorly-performing assets can be sold to unwitting investors: the 'lemons problem' (Akerlof, 1970). If the financial sector retains better-performing assets, it can capture a proportion of the yield using leverage to buy equity or to invest in corporate bonds. When asset prices are on the verge of collapse, profits can still be made in short-term trading positions via derivatives.

The core balance sheet transactions to these financing decisions are outlined in **Table 8.5**. There are four sectors: i) households ii) firms iii) retail banks iv) shadow banks (which includes investment banks, private equity and off-balance sheet operations) and v) government. The key to the development of shadow banking was therefore a combination of financial deregulation and the offshore recycling of trade deficits as collateral and reserves. Financial deregulation of the banking sector was boosted in the 1980s with the 'de facto repeal of Glass-Steagall' (Reinicke 1995, p. 114) when US banks began to grow their mortgage securitisation businesses through subsidiaries; in June 1989 J.P. Morgan began to underwrite and deal in corporate bonds via affiliates and foreign subsidiaries; in 1987 both Japan and Canada 'adopted legislation permitting both domestic and foreign bank holding companies to own securities firms' (Kaufmann and Mote, 1990, p. 413). By 1990, US retail banks that were members of the Federal Reserve were able to do everything that investment banks could do, except for underwriting and trading (Kaufmann and Mote, 1990, p. 418).

Together, these de facto repeals created a liquidity backstop for shadow banking. They were supported by the Federal Reserve System and other central banks because these reforms gave 'institutions in the shadow banking sector... access to wholesale funding' (Gabor, 2011, p. 7). Now it was possible for 'institutions outside the domain of banking

regulation (to) finance themselves by issuing short-term debt in wholesale markets that invested in tradable assets with longer maturities' (M. Hellwig, 2010, p. 3). Behind these short-term funding markets stood the central bank where 'our world is organised as a network of promises to buy in the event that someone else doesn't buy' (Mehrling et al. 2013, p. 7):

	Households	Firms	Retail Banks	Shadow Banks	Government	Σ
Tangible assets	$+ p_h H$	$+ p_k K$				$+ p_h H$ $+ p_k K$
Financial assets	$+ p_s S_h$	$- p_s S$		$+ p_s S_{sb}$		0
Govt bonds	$+ p_b B_h$			$+ p_b B_{sb}$	$- p_b B$	0
Short-term funding ¹⁹	$-(1+r) L_h$	$-(1+r) L_f$	$+(1+r) L$	$-(1+r) L_{sb}$		0
Σ	$+ NW_h$	$+ NW_f$	$+ NW_b$	$+ NW_{sb}$	$- NW_g$	$+ p_h H$ $+ p_k K$

Table 8.5. Shadow banking. Adapted from (Eatwell et al., 2008, p. 7).

Where H = household assets; K = capital goods; S = private financial securities (bonds and equities); p_s = security prices; B = government bonds; p_b = government bond prices; L = loans; r_L = loan rate; NW = net worth. The suffixes h, f, b, sb, g refer to households, firms, banks, shadow banks and government respectively.

¹⁹ Intermediated by retail banks as securitisation of household and business loans

Under deregulation, the shadow banking sector can take advantage of information asymmetry and cheap funding to profit from leveraged investment in government bonds, corporate bonds and equities. In general terms, the shadow banking sector is profitable as long as the short-term funding rate is less than the long-term yield in other asset classes. **Equation 3.8** showed the relationship between the beta, risk free rate and rate of return on the market (**Equation 3.8**). Provided the lending rate to shadow banks is less than the expected return on their portfolio, they can earn a profit by leveraging:

$$\text{Equation 8.1: } E(R) = R_f + \beta_i(E(R_m) - R_f) - r_{ib}$$

Where $E(R)$ = expected return on the portfolio; R_f = risk-free rate; β_i = the beta (sensitivity to market movement) of the investment and itself defined by $\beta_i = \frac{\text{cov}(r_i, r_{\text{market}})}{\sigma_{\text{market}}^2}$; $\text{cov}(r_i, r_{\text{market}})$ = the covariance between the market and investment return; σ_{market}^2 = the variance of the market; $E(R_m)$ = expected return on the market; and r_{ib} is the interbank rate

A leveraged investor needs to have sufficient capital to cover short-term losses, which makes them particularly dependent on short-term funding to avoid fire sales of long-term assets. Consider an investment in low risk government bonds that yield five per cent with a beta of 0.1 and where banks can borrow at two per cent; the expected profit is 2.3 per cent:

$$\text{Equation 8.2: } E(R_i) = 0.02 + 0.1(0.05 - 0.02) - 0.02 = 0.023$$

Similarly, consider an investment in high-risk equities with a yield of ten per cent and a beta of 2 at the same interbank rate; the expected profit is 18 per cent:

$$\text{Equation 8.3: } E(R_i) = 0.02 + 2(0.10 - 0.02) - 0.02 = 0.18$$

As well as trading risk, shadow banks earn profits by exploiting the liquidity option shown in **Equation 1.3**: the Expectations Hypothesis (EH) that the long-term yield will be higher than a series of short-term investments as a reward for giving up liquidity. When asset prices fall an investor who is adept at market-timing will deleverage or switch to more liquid assets, such as government bonds: being able to trade an information advantage is useful. Under these conditions, increases in the interest rate or a rise in the value of the funding currency would be met with volatility and falls in equity prices from deleveraging.

Figure 8.1 shows, in detail, how cheap Yen funding came to an abrupt halt for investors in the UK and US as the Yen strengthened and the carry trade began to unwind towards the end of 2006. The Yen 3-month interbank rate had hovered around 0.1 per cent since 2001 and the Japanese Ministry of Finance had been a major buyer of US government debt, driving down the Yen (**Chapter Six**). However, when rates in Japan began to rise towards the end of 2006, the Yen strengthened and there was no other funding currency. This lack of cheap liquidity persisted until the end of 2008 when the Swiss interbank rate began to fall in response to the GFC, followed by the US, UK and Europe. Taking account of exchange rate losses on carry trades, international liquidity had dried up prior to the GFC:

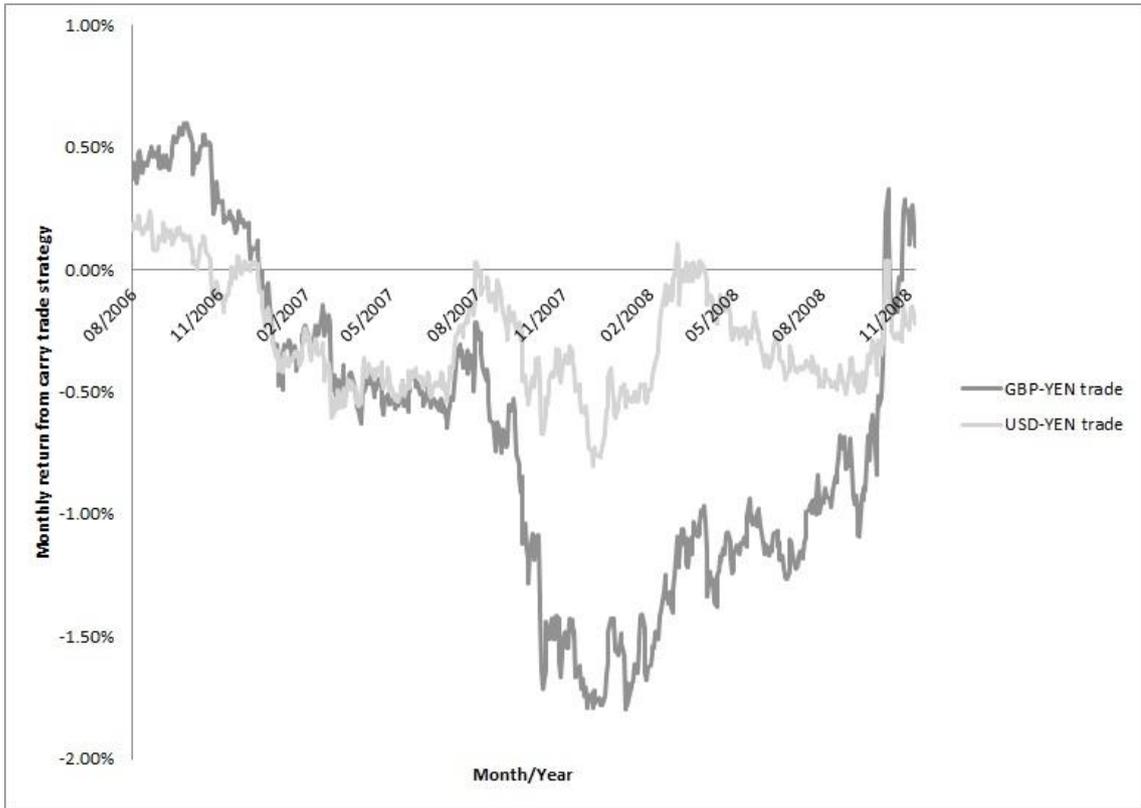


Figure 8.1. Yen carry trade unwinding (Sources: Reuters WM, Bankscope, own calculations).

Consistent with this story of deleveraging and a shift towards less risky assets classes, there were sell-offs in all equity markets and in emerging and Asian equity markets in particular:

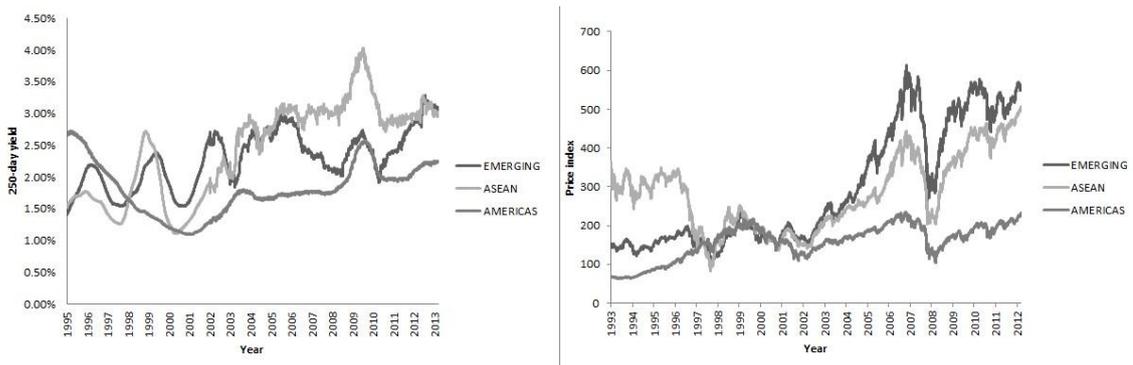


Figure 8.2. Equity market declines. LHS shows yields rising to levels not reached since the mid 1990s; RHS shows declines in equity prices (Sources: Datastream. FTSE price indices AWALEGL(PI), AWASENL(PI), AWAMERL(PI); yield calculated by subtracting price index from FTSE total return indices AWALEGL(RI), AWASENL(RI), AWAMERL(RI)).

As discussed earlier, these speculative trades rely on leverage, and banks are limited in the amount of lending they can do by their reserve ratios. **Table 8.6** shows, through a series of transactions, how the recycling of trade deficits by shadow banks supports higher lending offshore. In this example, the government issues Treasury bills to finance deficit spending. The central bank accepts these Treasury bills for cash (D) which results in the domestic and foreign sector earning deposits which they place with domestic and shadow banks respectively (D_b and D_{sb}). These banks swap their cash for the Treasury bills (B_b and B_{sb}) as they prefer interest-bearing reserve assets. At this stage there is no leverage. The next step is for the retail and shadow banks to lend to each other in the interbank markets:

Transaction	Central Bank		Treasury		Retail Bank		Shadow Bank		Other sectors		Σ
	Asset	Liability	Asset	Liability	Asset	Liability	Asset	Liability	Domestic	Foreign	
Issue T Bills	$+B$	$-D$	$+D$	$-B$							0
Government spending			$-D$		$+D_b$	$-D_b$	$+D_{sb}$	$-D_{sb}$	$+D_b$	$+D_{sb}$	0
Banks swap cash for T Bills	$-B$	$+D$			$-D_b$		$-D_{sb}$				0
					$+B_b$		$+B_{sb}$				
Interbank lending to buy securities					$+S_b$	$-L_b$	$+S_{sb}$	$-L_{sb}$			0
					$+L_{sb}$		$+L_b$				
Σ	0	0	0	$-B$	$+B_b$	$-D_b$	$+B_{sb}$	$-D_{sb}$	$+D_b$	$+D_{sb}$	0
					$+S_b$	$-L_b$	$+S_{sb}$	$-L_{sb}$			
					$+L_{sb}$		$+L_b$				

Table 8.6. Limits to leverage. Where B = government debt; D = deposits; S = securities; and L = loans. The suffixes b , sb refer to banks and shadow banks respectively.

Assuming a trade deficit of five per cent ($\frac{B_{sb}}{B_b} = 0.05$) and a leverage (loans to reserves) ratio of twenty to one ($\frac{L_{sb}}{B_b} = 10$) the shadow bank can lend nine and a half times the original government spending; at the same leverage ratio the retail bank can lend half the original spending ($\frac{L_b}{B_{sb}} = 10$). In this example, with a five per cent trade deficit and shadow banking system there is no shortage of buyers for financial assets or risk of crowding out between the private and public sector until total lending approaches ten times the level of government spending.

The total amount of lending is impacted by the reserve requirements for banks. Should banks be required to back deposits 100 per cent with government-issued debt then banks would have far fewer reserves to back lending. In the 'Chicago Plan Revisited', there is a proposal to back deposits with government-issued debt and create a new type of reserves (treasury credit) to back investment lending (Benes and Kumhof, 2012, p. 6). The insight here is that leverage depends not only on the reserve ratio, but also on the composition of reserves and the assets accepted as collateral in derivatives markets. Again, the management of liquidity provision is key. The use of cash-like instruments as collateral²⁰ increases the amount of liquidity available for trading. Repo and reverse repo markets allow participants to swap cash for government and other securities (and vice-versa) and their use 'grew significantly after the burst of the dot-com bubble' (Gabor, 2010, p. 253).

In response to these liquidity risks, the Federal Reserve is dealing liquidity directly with money market funds and primary dealers (Federal Reserve Bank of New York, 2014). In other words, the shadow banking sector is being brought into centralised, liquidity management processes as a regulatory response (see also Eatwell et al., 2008, p. 1; New Economics Foundation, 2013, p. 11). Given the size of the shadow banking sector, 'US Dollar lending and borrowing by banks outside the US... (estimated to be) about 9

²⁰ Pozsar provides a useful hierarchy of money including currency and reserves (backed by Treasury notes, agency debt and RMBS); government repos (collateralised by public assets); government-only money funds; bank deposits (backed by loans); private repos (dealer credits backed by private assets); and money funds backed by private assets. 'These instruments have one common attribute, which is that they promise to trade at par on demand. This makes the money. But not all money claims are created equal... (demand deposits) settled via transfers of reserves between banks' reserve accounts maintained at the central banks (have a) unique role in forming the backbone of the payments systems and facilitating the payments of all entities lower in the system-hierarchy' (Pozsar, 2014, p. 9).

trillion US Dollars and nearly 8 trillion US Dollars respectively' (Pozsar, 2014, p. 52), there is certainly the possibility of a future crisis in the non-banking sector.

Financialisation

The third part of this chapter looks at the impact of financialisation. In this example, sectors in the real economy use government cash-flows as a basis for further lending. This behaviour implies a multiplier model of government deficit spending, via privatisation, where government commitments drive private sector growth. The full model is described in **Appendix 4**.

At the core is a closed economy model where banks lend to businesses and households. The government sector spends taxes received, but there is no government borrowing and there is no external sector. Instead, government deficits are demanded by the private sector, which relies on government cash-flows to fund new investments.

Businesses use a proportion (*factor*) of these investments to pay wages, and the remainder (*1- factor*) to invest in property, machinery and raw materials. In other words, a rise in (*factor*) represents a move from manufacturing towards services, where wages make up a higher proportion of total costs.

Taxes are applied to wages (T_w), to loan payments (T_l), to spending by businesses, households and banks (T_c), to investment gains (T_i) and to business and banks (T_b). Wage, loan and investment taxes are applied before spending; consumption taxes are applied after spending and it is the ex-post financialisation of these additional taxes that drives growth. Hence the private sector is indebted to the government in the form of unpaid taxes. For example, businesses might spend on plant and machinery and be unable to settle their end-of-year tax bill; and households might be unable to meet an inheritance tax bill and be forced to sell or remortgage existing assets. As a result, there is government deficit spending but this is driven exogenously by the behaviour of the private sector.

The second effect driving growth is that government spending with the private sector is accepted by banks as reliable income for private borrowing. With privatisation, government outsourcing and government support for service sector growth, the

private sector develops a steady stream of new income which funds additional private borrowing. Hence, in each cycle, the private sector expands its balance sheet in response to government commitments.

The financialisation of new income streams drives growth in this model, but it also creates instability. These financialisation processes introduce quadratic terms which are retained in the simulation model, but dropped from **Equation 8.4** and **Appendix 4** to make presentation clearer. Without the impact of savings and investments, the main drivers for total spending are wages (w_r); a shift towards services (*factor* $\rightarrow 1$) and all forms of taxation (T_c, T_l, T_i):

Equation 8.4:
$$\text{Total spending} = I_b \cdot (r_L + T_c + r_L \cdot T_l - r_L \cdot T_c) + \text{factor} \cdot I_b (w_r + T_c - wr \cdot T_c - Sb \cdot rb(1 - T_i - T_c) + Tb)$$

Where a rise in *factor* represents growth in the service sector; T_w = tax on wages; T_l = tax on loans; T_c = tax on consumption; T_i = tax on investments and T_b = tax on businesses.

The quadratic terms introduce instability. Intuitively, these terms represent the hierarchical financialisation of government cash-flows by the private sector: primary spending leads to secondary spending, and so on. One possible scenario is that when there is a 'widely perceived shortage of money' (Laidler and Stadler, 1998, p. 817) this might set in place feedback loops where households and firms prefer to hold goods than retain cash, accelerating the impact of government spending as hard money passes between layers in the hierarchy. Another possibility is that, with a shift from manufacturing to services, *factor* increases above one because wages from service professionals (lawyers, dentists and so on) form the basis of wages for service providers (childcare, mechanics, and so on), who in turn employ low-wage service providers (builders, hairdressers, and so on). Paradoxically, if the pyramid is higher (such as more inequality) then primary deficit spending by government has a greater impact.

Another feature of the model is that investment gains have a dampening effect on spending ($-S_b \cdot r_b$). Intuitively, this is because investment gains are not immediately spent but represent a buffer stock for the private sector, which would otherwise be in a permanent state of indebtedness.

The next section tests the model, using estimated parameters. According to (Benes and Kumhof 2012, p. 43) wage taxes (T_W) in the US are about 17.6 per cent of GDP, consumption taxes (T_C) about 4.6 per cent of GDP, and capital taxes (T_i) about 3.2 per cent of GDP. Meanwhile the marginal income tax rate in the US is 25 per cent marginal tax rate and the capital gains tax rate is 20 per cent. Loan taxes are zero, and the proportion of loans that are spent on plant and machinery is set to 60 per cent (this is based on **Figure 7.1** which shows the US wage bill is approximately 40 per cent of the total liabilities of non-financial businesses).

There is no deficit spending in the model (except from the financialisation of new cash-flows); there is no external sector; and there are no booms and busts in asset prices or the complications associated with different yields on different assets ($r_L = r_b = 0.05$). This mitigates the impact of stocks on the model. The initial loan size for households and businesses is set to 100 units. Businesses follow two simple accounting rules, which are to i) make investment decisions based on their income cash-flows and ii) invest in property, machinery and labour in a fixed ratio.

Despite these unrealistic simplifying assumptions, the model shows emergent behaviour. The results of a simulation using estimated parameters are shown in **Figure 8.3**:

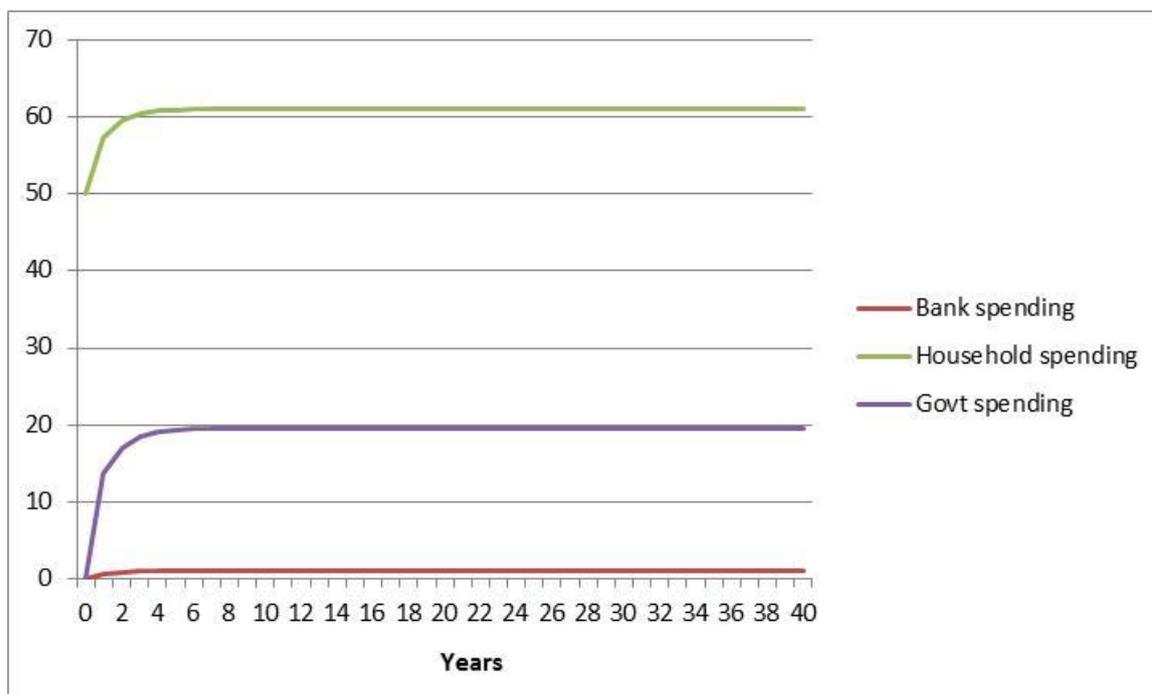


Figure 8.3: Multiplier effect of financialisation. Where $w_r = 1$; $factor = 0.6$; $T_l = 0$; $T_i = 0.2$; $T_c = 0.046$; $T_w = 0.25$; $T_b = 0.01$

There is a multiplier effect from the private sector hierarchy, driven by the financialisation of government cash-flows and the expansion of private sector investment against this income. The stability of the model depends on the credibility of the government to meet future cash-flow payments – which will be undermined if the government is not a currency issuer. However, if the government can meet future obligations the model is stable. Apart from consumption taxes (which are driving financialisation in this example) taxes can be set to 100 per cent and government spending can expand to 70 per cent of total spending in this simulation:

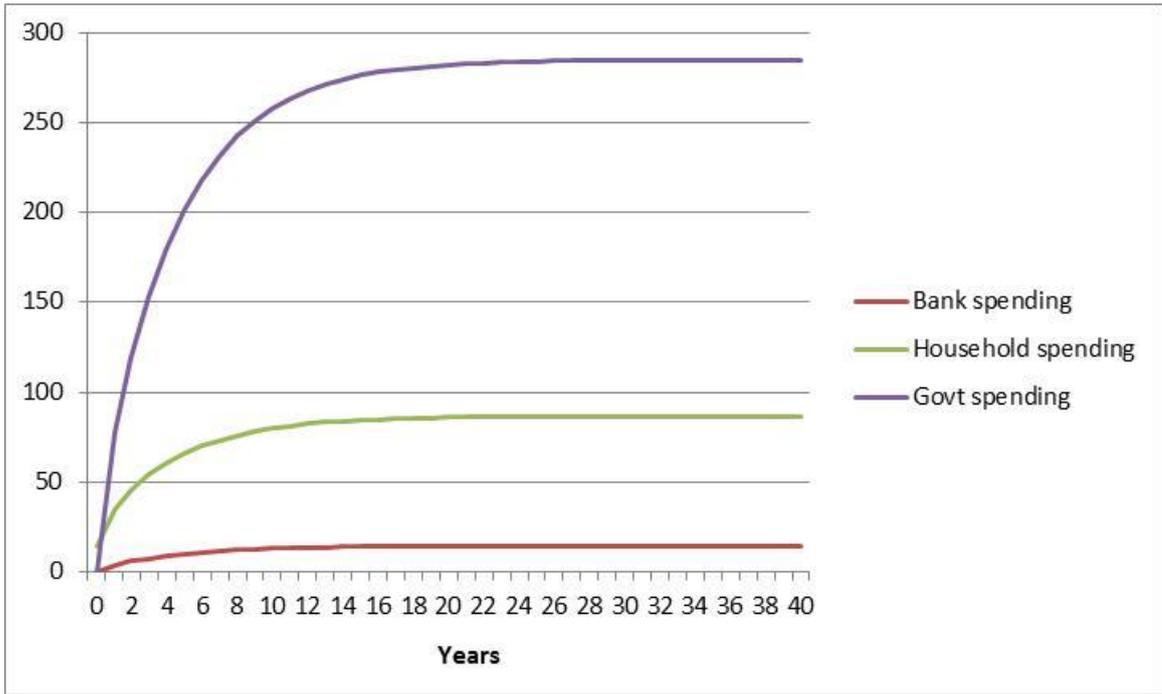


Figure 8.4: Expanding GDP by government-led growth. Where $w_r = 1$; factor = 0.6; $T_l = 1$; $T_i = 1$; $T_c = 0.25$; $T_w = 1$; $T_b = 0.01$

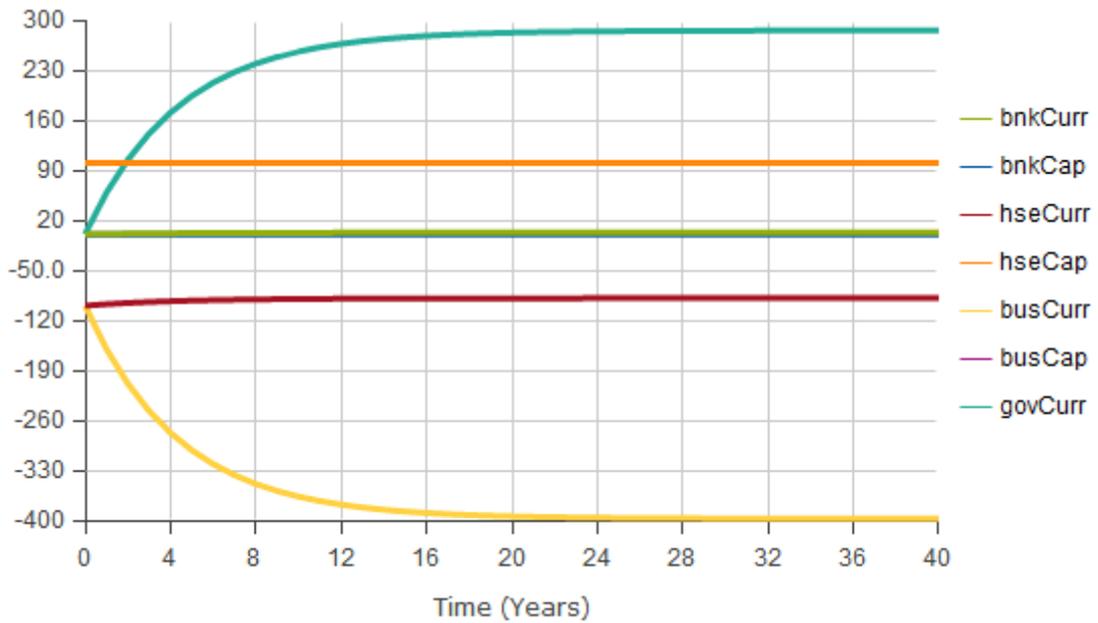


Figure 8.5: Expanding GDP by government-led growth, the balance sheet counterparts.

However, the stability of the model is undermined by changes in private sector behaviour. In the model that follows, the wage rate is 2.5* the loan rate (the private sector pyramid is taller). A typical scenario would be a economy with a small manufacturing sector and large, hierarchical service sector – spending by service businesses at one layer is income for other service businesses at the next layer. The impact of government spending is magnified – with the same tax rates as **Figure 8.3**, these hierarchical effects have grown total spending more than three-fold:

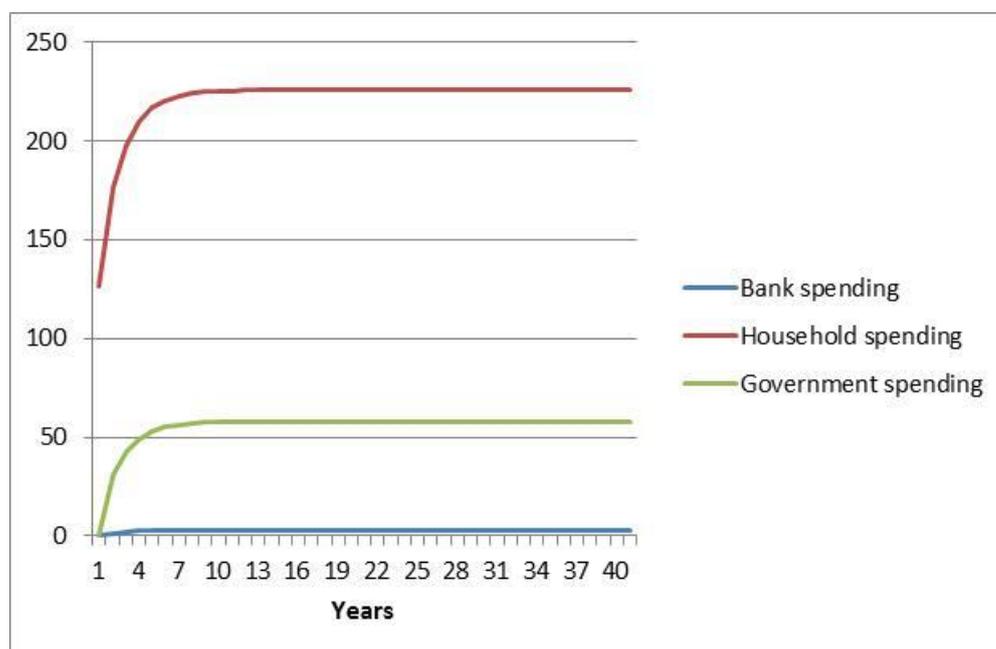


Figure 8.6: Multiplier effect of services hierarchy. Where $w_r = 2.5$; factor = 0.6; $T_l = 0$; $T_i = 0.2$; $T_c = 0.046$; $T_w = 0.25$; $T_b = 0.01$

However, with this hierarchical private sector, high initial growth rates fall to around two per cent and the government sector is limited to around 35 per cent of the total (**Figure 8.7, LHS**). If the growth in primary government spending (and, therefore, further financialisation) rises above 25 per cent the model shows emergent instability (**Figure 8.7, RHS**):

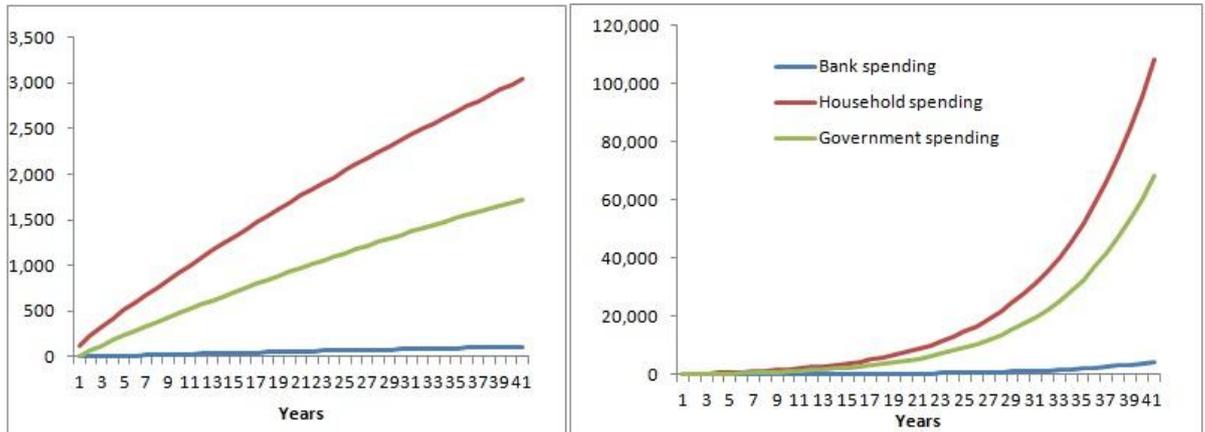


Figure 8.7. *Instability from high rates of financialisation via government spending.* Where $w_r = 2.5$; $factor = 0.6$; $T_l = 0$; $T_i = 0.2$; $T_w = 0.25$; $T_b = 0.01$. Consumption taxes, which in this simulation are driving financialisation, are higher on the RHS ($T_c = 0.25$ on LHS; $T_c = 0.30$ on RHS).

However, there are alternatives. Since investment and loan taxes are not financialised in the model, it remains stable even with 500 per cent tax rates provided the government can meet its payment obligations (is a monetary sovereign). As long as the government spends its higher income, businesses remain solvent by charging higher prices, stimulating further private sector investment and spending. The impact of investment and loan taxes is to shrink the banking sector to a fraction of its former size:

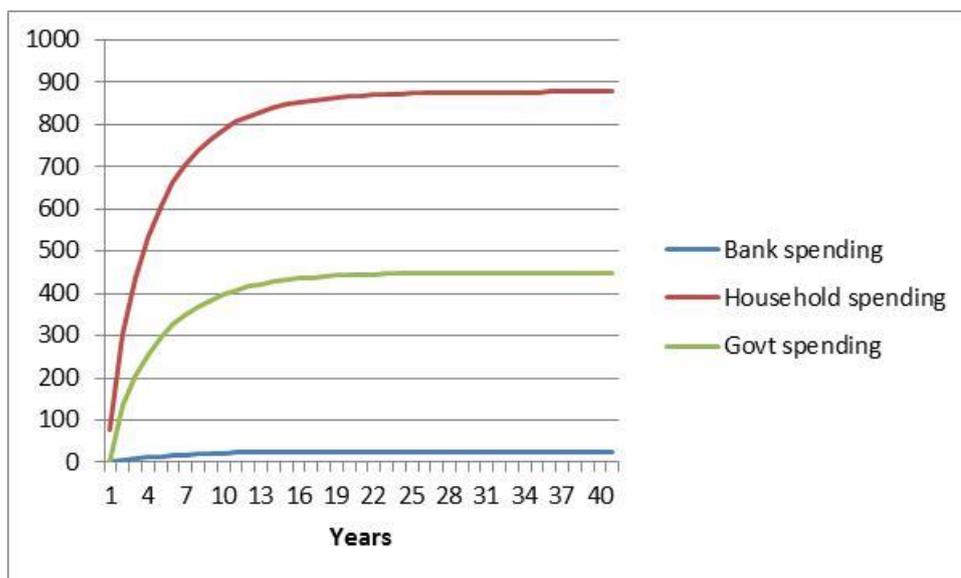


Figure 8.8: Shrinking the relative size of the financial sector with investment and loan taxes. Where $w_r = 2.5$; $factor = 0.6$; $T_l = 5$; $T_i = 5$; $T_c = 0.046$; $T_w = 0.25$; $T_b = 0.01$

These are artificial results, but they illustrate several important features. First, when the private sector is avoiding or deferring tax, this can force government deficit spending exogenously. Secondly, if the government is considered to be default-free by the private sector, and government cash-flows are financialised by the private sector, there is a multiplier effect from government spending to growth. These multiplier effects are exaggerated if there are hierarchies in the private sector, where spending trickles down from primary to secondary and other levels in the private hierarchy. However, the multiplier effect of private sector hierarchies reduces the relative size of government and increases the sensitivity of the economy to cuts in government spending. In other words, private sector hierarchies create instabilities and limit the possibilities of government-led growth without deeper tax reforms. These tax reforms might include taxes on loans and investments to shrink the banking sector relative to the rest of the economy.

Too many degrees of freedom

The tentative conclusion from the models presented here, and from the models in **Chapter Seven**, are that the behaviour of the economy varies depending on a wide

range of factors: the private financing decision; the interaction between stocks and flows; tax rates; financialisation; government policies towards financialisation; external stocks and flows; private sector hierarchies; the size of the shadow banking sector; and so on. Given there are so many variables, it seems unrealistic to assume that one economic model will fit all economies. Rather, there will be a wide-range of models and behaviours, including emergent behaviours, feedback loops and dynamic properties. Models might help to explain the past but are unlikely to be able to predict the future.

Table 8.7 shows the degrees of freedom introduced by the models in this thesis. First, there are the three types of financing decision for each sector: hedging, speculative and Ponzi. Second, there are the financial flows with the foreign sector, which might be positive (profitable lending to foreign businesses and governments) or negative (profits and interest payments flow abroad). Third, is the nature of the balance of payments, which might be export-led (the export of goods and surpluses) or finance-led (the sale of financial assets and transfer of ownership of capital assets such as land and property). Fourth, there is the shadow banking sector, which might be non-existent, growing or deleveraging. Fifth, there is the monetary sovereignty (or lack thereof) of the government. Sixth, there is the degree to which the private sector is organised hierarchically and multiplies the effect of government spending:

	Households	Firms	Banks	Shadow banks	Government
Financing modes (15)	Hedging	Hedging	Hedging	Hedging	Surplus
	Speculative	Speculative	Speculative	Speculative	Balanced
	Ponzi	Ponzi	Ponzi	Ponzi	Deficit
Government transfers (6)	Negative	Negative	Negative	N/A	N/A
	Positive	Positive	Positive		
Foreign income (6)	Negative	Negative	Negative	Negative	
	Positive	Positive	Positive	Positive	
Nature of balance of payments (2)	Export-led				
	Finance-led				
Shadow bank lending and leverage (2)	Growing				
	Shrinking				
Monetary sovereign (2)	Yes				
	No				
Private sector (2)	Flat				
	Hierarchical				

Table 8.7. Possible degrees of freedom

Conclusions

The focus of this thesis has been the relationship between liquidity provision, the financing decision, the institutional structure of the economy, and the interest rate. While **Table 8.7** shows over 8,000 potential configurations, some combinations are incompatible. Speculative and Ponzi behaviour depend on accommodative behaviour by the central bank, stepping in as lender of last resort during crises; shadow-banking requires the offshore recycling of trade deficits; foreign income depends on a developed financial sector; and government transfers to the private sector are limited where there is no monetary sovereignty. How to model an economy will vary according to the institutional context, history, legal context and behaviour. By relaxing the assumption that equilibrium is reached by interest rate policy, the modelling task becomes complex.

By calibrating the stock-flow-consistent model to a particular context, or by using it to understand a particular phenomenon, valuable insights are possible. In this Chapter, with a two economy model (BanksCountry and GoodsCountry), high interest rates for export-led economies and low-interest rates for consumption-led economies emerge as a Washington Consensus that favours the deficit economy. Where there is no shortage of liquidity, monetary expansion is most likely to gain consensus; low interest rates help stressed households, governments and businesses deal with solvency issues. An export-led economy that relies on foreign banks is at risk from exogenous interest rate rises, and a fall in the domestic exchange rate should capital take flight.

In a shadow banking model, profits are captured by leveraged investors. Profit capture and accumulation weakens demand, which the central bank responds to with lower interest rates under inflation targeting. Under a unified banking model, with information sharing between retail and investment banks, the risk that the financial sector will exploit information advantages in short-term trading are increased. The driver for this is cheap funding in liquid markets, borrowing short-term at low interest rates to buy long-term assets. With interbank lending and offshore recycling of trade deficits, the private sector is unlikely to be limited by the amount of new loans it can

create endogenously. However, when cheap Yen funding came to an abrupt halt towards the end of 2006, the subsequent unwinding of the carry trade was followed by sharp declines in equity markets as the financial sector deleveraged.

Governments can promote growth in the private sector where government cash-flows are used to fund private investments. These processes rely on there being a steady stream of new income from the government from privatisation and outsourcing. If the private sector is organised hierarchically, the multiplier effect is exaggerated and the impact of cuts to government spending is greater. The behaviour of the model depends to a large extent on the use to which government spending is put, with feedback loops and tipping points in the model. A simulation with parameters that approximate real values for a developed economy, the model settles to a maximum growth rate of around two per cent. Private sector hierarchies give an illusion of growth, and they limit the size of government relative to the private sector. In turn, the relative size of the financial sector can be shrunk (and the economy continues to grow) when a sovereign government stimulates domestic spending by raising taxes on loans and investment income.

The story in each of these models is that outcomes depend heavily on financial behaviour and who has access to liquidity (governments, banks, shadow banks, households or firms). The final Chapter of this thesis brings these insights together to suggest strategies to regulate the carry trade for both high and low interest rate economies.

CHAPTER 9: Summary and conclusions

History

Before World War I the Gold standard had developed as ‘a gradual process. There was no international legal foundation – no treaties, agreements or conferences’ (D’Arista, 2009, p. 635). After the turmoil of the interwar period and World War II, there was a negotiated settlement for convertibility to gold via the US Dollar, overseen by the Bretton Woods institutions. A country could change the par value of its currency in the event of a payments disequilibrium, on the approval of the IMF (Bordo, 1993, p. 35). With tight capital controls and the US running trade surpluses, goods could be exchanged for fiat currencies in the expectation that US Dollars would be exchanged for gold in Washington. However, when Nixon closed the gold window, convertibility ended.

The free float era emerged from this uncertainty: ‘people didn’t know how floating exchange rates were going to work ... and very quickly after ... the breakdown... there came the first oil shock... the arrangements to recycle capital flows weren’t in place’ (2012 interview with UK central banker ALLADIN). The subsequent decades have seen financial crises triggered by speculative capital flows: a surge in bank loans to Mexico in the 1970s; real estate and stock bubbles in Japan, Finland, Norway and Sweden from 1985-9; real estate and stock bubbles in Thailand, Malaysia and Indonesia from 1992-7; a foreign investment bubble in Mexico from 1990-9; a stock bubble in the US from 1995-2000; real estate bubbles in the US, Britain, Spain, Ireland and Iceland from 2002-7; the Greek government debt crisis; and so on (Kindleberger and Aliber, 2011).

Pluralist approaches to economics

The standard macroeconomics textbook model (Economics 101) and modern finance theories offer little in the way of explanation for financial crises and persistent anomalies such as the carry trade. The assumptions have been that economies are self-adjusting through price adjustment, and that the carry trade will be arbitrated away with sufficient liquidity. At the core of Economics 101 is a market economy (Gärtner, 2003, p. 7). Yet the empirical evidence shows that, for a particular currency or country, there are long-term trends that suggest economies are unstable and

dynamic systems: imbalances between savings and investments; balance sheets distorted by leverage; tax avoidance; profit retention, and so on. The nature of economies also changes over time. For example, global equity yields fell below government bond yields in 1959 in the US (**Figure 3.2**) with similar patterns in the UK and Japan, shortly after the publication of the Modigliani-Miller theorem on optimal capital structure (Modigliani and Miller, 1958). This is consistent with the idea that the economy is a social construct (MacKenzie, 2003, p. 108), not simply an object of scientific study.

Private financial assets have grown more quickly than the underlying economy across a wide range of asset classes and countries. When the Maastricht treaty came into force on 1st November 1993 there was a surge in bond issuances that approached half of World GDP and was followed by the Asian bubble and dot-com bubble in equity markets (**Figures 1.5** and **1.6**). In parallel, there has been a concentration of financial market activity both geographically (TheCityUK, 2012, p. 4) and institutionally (Vitali et al., 2011, Appendix S1, Table S1). A 'leverage induced "global banking glut"' (Independent Evaluation Office, 2012, p. 8) has dwarfed the balance sheets of central banks, households and governments, suggesting that global liquidity is an endogenously-driven process.

Underpinning the provision of private liquidity are offshore, or shadow, banks. The Nixon shock was preceded by a four-fold increase in the assets and liabilities of Eurodollar banks between 1966 and 1970 (Friedman 1971, p. 16) due to US trade deficits. Offshore US Dollars were favoured by Russia because of the risk that domestic US Dollars would be impounded, and Eurodollar banks grew as a consequence of Regulation Q (a ceiling on deposit rates) and the interest equalization tax (Hawley, 1987, p. 47). These offshore deposits are boosted by tax avoidance and profit retention. Foreign holdings of US Treasuries support this picture: in September 2013, most foreign holdings were in Japan then China (both at \$1.8 trillion); followed by the United Kingdom, Cayman Islands and Caribbean (US Department of the Treasury, 2013b).

With tax avoidance and offshore deposits come financial leverage. **Figures 1.3 and 1.4** show that Luxembourg and Ireland have been increasing unconsolidated liabilities rapidly, followed by the UK and Netherlands. Tax avoidance techniques such as the Double Irish and Dutch sandwich (Bank, 2013) and the dual nature of banks' balance sheets, both onshore and offshore, enable greater leverage (Eatwell et al., 2008, p.7; **Table 8.5**). Financial deregulation since the 1980s (Reinicke 1995, p. 114) allowed international banks to develop cross-border markets in securitised loans. Balance sheet growth was driven by cross-border securitisation, cross-border M&A and intra-financial leverage (Barwell et al., 2011, p. 16). Balance sheet expansion is driven by the search for yield: a variety of cross-border carry trades that are driven by the ready availability of cheap money for financial speculation. When the dot-com bubble burst, losses were contained because leverage had largely been funded by equity. However, leading into the GFC, banks relied on wholesale funding in the short-term interbank markets with funding gaps in the household, commercial real estate and private equity sectors (Barwell et al., 2011, p. 24).

In other words, there is no natural equilibrium towards which the economy is headed, that would arbitrage away persistent carry trades. Instead, cheap liquidity has driven asset bubbles around the world. Inflation targeting creates profit opportunities, because high interest rates attract foreign investment in search of yield. In contrast, low interest rates and deregulation stimulate cross-border carry trades and credit-fuelled spending. There is no single model that describes these different economies, but a wide range of models with different behaviours: different responses to interest rates; local and regional differences in institutions; variations in tax; changing monetary arrangements between the central bank and government; varying pressures due to the external position; the growth of shadow banking; differences in private sector structure (and their dependency on government deficit spending); different loan default rates; and so on.

The method in this thesis is based on an accounting approach, which was summarised in **Chapter Four**. This approach has eight key features, starting with the relaxation of equilibrium as a condition. The other seven features are that i) there cannot be any "black holes" and every flow must have an origin and a destination ii) retained profit

plays a key role (such as tax avoidance and trade surpluses) iii) governments that have monetary sovereignty do not need to run balanced budgets iv) liquidity, solvency and the financing decision define the behavioural equations for each sector v) money is never neutral vi) the money supply is determined endogenously by the private sector (and, in some cases, might be boosted by government credit creation) vii) investment decisions are multi-faceted, with factors such as the bankruptcy pecking order playing a vital role. These accounting models allow researchers to model economies as they are: unstable, dynamic and pluralist. In summary:

The thing is to a very large extent an exercise in accounting – or perhaps logic is a more congenial word... our claim is, I suppose, simultaneously a very modest and a very extravagant one. On the one hand we are sorting out a ghastly muddle and showing how, if you set up a complete system with a representation of all stocks and flows in a fully consistent manner, you close down a whole lot of options which otherwise appear to be open. The extravagant claim is to have as it were “swallowed” monetarism, using such insights as it brings to re-establish something very much like the “crude” Keynesian position, by which policy was generally regulated in the 50s and 60s.

(Godley, 1983)

The main conclusion of the simulations is that differences in the financing decision – hedging, speculative or Ponzi – lead to persistence in low and high interest rate economies. As behaviour moves from hedging towards speculative and Ponzi, the system becomes precariously liquid/illiquid and requires central bank support. There is nothing neutral about money in the model: different sectors have different preferences for interest rates, profit, wages, and so on. In the speculative and Ponzi models, banks lobby to enter investment markets to maintain their share of spending.

Seen through an accounting lens, improvements to the SNA and BOP become essential for research into the carry trade and foreign exchange risks in general. Improvements

would help policymakers pay closer attention to currency mismatches and duration risks. Understanding flow of funds between current, financial and capital accounts is difficult because stocks are reported net and flows are reported gross. There are also reporting differences between countries; measurement errors; data gaps caused by derivatives, secondary markets and financial innovation; and complex ownership structures.

There is no shortage of technological solutions to improve the quality of SNA and BOP data, with design patterns to improve matching, reconciliation and trade confirmation between countries and across time periods. These design patterns could allow for anonymity, localisation and translation (**Chapter Five**). Better reporting of flow-of-funds data, calibrated to stock-flow consistent models, would allow researchers to publish estimates of the sensitivity of the economy to currency mismatches and duration risks, taking account of differences in initial conditions (history) on the model.

Club Class central banks

The carry trade is underpinned by cheap liquidity from low interest rate economies. In turn, these economies are supported by central banks whose membership is 'restricted to the United States Federal Reserve, the Bank of England, the European Central Bank, the Bank of Japan, the Swiss National Bank, and the Bank of Canada' (Pistor, 2014). These central banks adopt a wide range of policies to support financialised economies, with near zero interest rates as the core policy that funds carry trade strategies (Hudson, 2010, p. 12; Stiglitz, 2010; 2012 interview with UK FX manager SPACEMAN).

However, there are other supportive policies, in particular QE and financial leverage which underpin asset prices, entrenching existing patterns of wealth distribution at the same time (Bank of England, 2012a; Joyce et al., 2010). There is evidence of regulatory capture of these central banks by the financial sector: direct subsidies; barriers to market entry; price fixing of interest rates and exchange rates; regulations to block alternative currencies; revolving doors; and 'regulatory capture by sophistication' (Hellwig, 2010, p. 5). With central banks acting as 'the market-maker of last resort' (Treyner 1987, p. 28) they created new opportunities for price-fixing and collusion in

interest and exchange rate markets (Kregel, 2012; Touryalai, 2013; Treasury Committee, 2014; Wheatley, 2012, **Figure 1.11**).

There is quantitative evidence that some central bank acts as liquidity dealers of last resort during financial crises. During normal times, carry trade profit and loss in overnight money markets is lower than in interbank markets, with an extrapolated positive carry trade return at zero interbank rates (**Table 6.4**). The skew and kurtosis are consistent with the carry trade being an endogenous process. The return characteristics are time-varying (**Figure 6.8**). For example, the Lehman collapse is marked by a sharp reversal in the carry trade, with an implied negative carry trade return at zero interbank rates during the crisis.

Although FX trading volumes were rising prior to the GFC (**Figure 1.7**), there is no evidence that these higher volumes were arbitraging away the profits (**Figure 6.3**). Neither is there any evidence of market efficiency or a risk premium from disaggregating the G5 carry trade by currency and currency pair; instead, the patterns suggest a co-ordination problem with lending in Sterling and US Dollar at the centre (**Figures 6.9 and 6.10**). This finding is supported by a stock-flow-consistent estimate of balance sheet profits and losses. The findings are that exporters in Germany and Japan made foreign exchange losses prior to the GFC (**Figure 6.7**); the Japanese Ministry of Finance and Euro area central banks made significant losses on foreign currency assets prior to the GFC; and the People's Bank of China absorbed losses of around 600 billion US Dollars in the four years following the GFC (**Figures 6.5 and 6.6**). These findings are consistent with practitioner stories that losers in currency markets are 'forced sellers, people who are importing goods, tourists, corporate treasurers, pension funds, those sorts of things' (2012 interview with UK FX manager SPACEMAN).

These findings support the thesis that Club Class central banks have been captured by financial sector interests: providing cheap funding for speculation during normal times and supporting financial balance sheets during crises. There is a long-term trend for interbank rates to fall (**Figure 6.1**), supporting further leveraged speculation and exacerbating financial risks. This trend for low interest rates is summarised here as a Financial Consensus that underpins the carry trade.

The Financial Consensus

The Washington Consensus (Williamson, 1990) focussed on policies that supported high rates of profit in surplus countries. In response to capital flight, the prescription was to raise interest rates, lower wages, target government spending, lower taxes, and so on. Yet excessive liquidity provision at low interest rates is ‘the Achilles heel of the present-day international monetary and financial system’ (Borio, 2014, p. 1). Liquidity provision is one of six policies, identified in this thesis as a Financial Consensus that underpins the carry trade:

1. Keep interest rates low, somewhere (the liquidity put),
2. Use liquidity and leverage to defer solvency problems,
3. Settle foreign exchange and speculative trades in domestic currency,
4. Carefully manage the external position,
5. Be able to competitively devalue, and
6. Recycle your own trade deficits and retained profits via offshore banks.

These policies are context dependent. For example, countries in the European periphery have not been able to competitively devalue because they rely on the Euro: instead, they have resorted to austerity measures and belated action by the ECB to reduce spreads on government debt (Lavoie, 2011, p. 22; Papadimitriou & Randall Wray, 2012, p. 14).

1. Keep interest rates low, somewhere (the liquidity put).

Much like the problems on the ECB’s balance sheet, the empirical results suggest that liquidity could be better co-ordinated between central banks. A relatively small shift towards contractionary monetary policy, in March 2006, was followed by a reversal in the Yen carry trade (**Figure 8.1**), deleveraging, and sell-offs in equity markets, particularly in Asia and emerging markets (**Figure 8.2**). Only after the GFC, collapse of Lehman Brothers and a lowering of rates did a recovery in equity markets take hold.

With internationally mobile capital, the source of cheap funding can vary; what matters is that someone, somewhere, will lend freely against collateral.

2. Use liquidity and leverage to defer solvency problems.

Shadow banking activity (private equity, M&A, investment banking), leverage, and QE, help to maintain asset prices in developed economies. The key policy instrument for liquidity support is to trade an ‘intrinsically useless asset’ at a positive price (Hellwig and Lorenzoni, 2009, p. 1157). Modern finance techniques, based on CAPM, will direct funding to a range of higher-yielding assets with the risk-free asset as a reference (**Equation 3.8**). Extending central bank liquidity to shadow banks (Federal Reserve Bank of New York, 2014) is a game changer in this respect. On the one hand, it offers the possibility of netting between shadow and domestic sectors and releasing ‘trapped pools of liquidity’ in the US-UK-European financial core (International Monetary Fund, 2011, p. 2). However, given the ready availability of such liquidity it also risks stimulating further carry trades and leveraged speculation.

Through an accounting lens, monetary policy looks to be second best to deficit spending by governments, because domestic government spending has a direct impact on the solvency of businesses and households (**Table 8.2**). Government spending can be targeted to specific sectors and objectives: to improve infrastructure, improve energy efficiency, reduce housing costs, reduce unemployment, and so on. Monetary policy to support asset prices, on the other hand, underpins existing financial inequality.

3. Settle foreign exchange and speculative trades in domestic currency.

An assumed feature of stable, low interest rate economies – on which the regulatory data are largely silent – is that they arrange for final settlement to be in domestic currencies. If derivatives and foreign exchange are settled this way, then during a financial crisis the central bank can always intervene by providing liquidity based on the ability of market participants to post collateral. In other words, the final settlement

currency, and the currency of collateral assets, determine which banks remain solvent during financial crises.

This creates an additional barrier to developing and emerging economies. Although there is some room for optimism that Club Class central banks will encourage settlement in other their own currencies, via unlimited swap lines (Bank of England, 2014; Rose and Spiegel, 2011; Swiss National Bank, 2012), there is little evidence that developing and emerging economies are being included. Instead, as discussed below, change is largely a result of bilateral and regional arrangements, similar to the development of the Gold standard before World War I.

4. Carefully manage the external financial position.

The lesson from developing and emerging market crises, including Argentina's current dispute over debt restructuring (Supreme Court of the United States, 2014), was to pay close attention to the external financial position and avoid external debt in foreign currency. The external liabilities of the US exceed external assets, but 'most US liabilities are in dollars, whereas a share of US assets are in foreign currency' (Gourinchas and Rey, 2007, p. 29) and the higher-yield on foreign currency assets provides the US with foreign income. The literature on current account sustainability (Gourinchas and Rey, 2007; Lane and Milesi-Ferretti, 2005; Obstfeld and Rogoff, 2005) suggests there may be a tipping point where higher interest rates on US liabilities, combined with lower returns on US assets, mean the US current account deficit might become unsustainable from the perspective of a particular sector or sectors. There are similar risks in other deficit countries.

Hence policymakers need to pay particular attention to the currency composition of the external position. The sensitivity of each sector to foreign exchange risks, at different durations, would be a useful macroprudential tool. A heat-map for different sectors would identify risks to stability from changes to domestic and foreign interest rates, such as Eastern European and Iceland household loans in foreign currency (Grønn and Fredholm 2013, p. 6; Gabor 2010, p. 257) .

5. Be able to competitively devalue.

The observable phenomenon after the Nixon shock was that low interest rate economies depreciate, rather than appreciate (Froot and Thaler, 1990, p. 182). For surplus countries, this decline in the purchasing power of financial assets is deflationary because it weakens domestic demand through household balance sheets: the US savings of Japanese citizens, for example, declined by over two-thirds between 1975 and 2013 (**Table 6.3**). These deflationary effects can be mitigated if foreign currency risks, from large trade surpluses, are carried by the central bank. In Europe, the ECB central banks absorbed losses up to an estimated 250 billion US Dollars at their peak in 2008 (**Figure 6.5**); for Japan the Ministry of Finance absorbed losses up to an estimated 350 billion US Dollars at their peak in 2013 (**Figure 6.6**); and for China the central bank had absorbed estimated losses of more than 600 billion US Dollars since 2008 (**Figure 6.5**). These public losses play an important role in buffering the real economy from deflation via wealth effects.

For deficit countries, the external position of the private sector poses systemic risks, such as those experienced in Latin America in the 1970s where large quantities of oil receipts were recycled as US Dollars loans (Vasudevan, 2009, p. 296) and dollarization reduced independence. The tipping points in the external position, at both the aggregate level and within each sector, is reached when foreign investment gains are less than the cost of servicing foreign loans:

Equation 5.9: $\sum_1^n (A_1 r_{A1} + A_2 r_{A2} + \dots + A_n r_{An}) - \sum_1^n (L_1 r_{L1} + L_2 r_{L1} + \dots + L_n r_{Ln}) < 0$

The tipping point can be reached even when there is a trade surplus, due to interest payments and profit flows abroad. Under pressure from a weak currency, the domestic sector must sell financial and capital assets, or fund those losses directly from other sources (such as wages). If fire sales lead to further declines in asset prices and capital flight, the result is a spiralling financial crisis.

The main defences against competitive devaluation and exogenous interest rate shocks are to borrow in domestic currency and for government to mitigate some, or

all, of the risks of competitive devaluation by actively managing foreign reserves. The combined effects, of self-insurance through reserve accumulation in surplus countries, and competitive devaluation through endogenous growth in money, are a 'non-system in international monetary policy... a source of substantial risk, both to sustainable growth as well as the financial sector. It is not an industrial country problem, nor an emerging market problem, it is a problem of collective action. We are being pushed towards competitive monetary easing' (Rajan, 2014, p. 9-10).

6. Recycle your own trade deficits and retained profits via offshore banks

7. .

The GFC emphasised the role played by the recycling of trade deficits: not as a primary factor, but as the basis for the growth of shadow banking and offshore leverage. The Bretton Woods era was successful because it created institutions to recycle US trade surpluses, with a promise of convertibility to gold. After the Nixon shock, those trade surpluses became deficits, but continued to be recycled as offshore Eurodollars, without netting with onshore banks – providing US Dollar liquidity to the rest of the world.

Conclusions

There are two sides to the carry trade. High interest rates drive profits, particularly in hedging economies where loans get repaid and default rates are low: these high rates, with interest rate payments to creditors in deficit countries, are driven by the Washington Consensus. When loans are denominated in foreign currency, borrowers are forced to bear the brunt of adjustment costs. However, there is also a more precarious, Financial Consensus that depends on the ready availability of cheap liquidity. Here, lenders bear the brunt of adjustment costs. Speculative banks can rely on their information advantages to pass losses onto other investors, with central banks as lenders of last resort during systemic crises.

The Financial Consensus depends on cheap liquidity from Club Class central banks; the ability to defer solvency issues through leverage; careful management of the external position; resilience to competitive devaluation; ultimate settlement of financial speculation in domestic currency; and institutional, offshore mechanisms to recycle retained profits and trade deficits. Together, these policies underpin the carry trade. Joining this Club Class of central banks is not easy, nor is it desirable given the risks from leveraged speculation at low interest rates. There is no evidence that market mechanisms will bring about institutional change, or that currency markets will tend towards a new equilibrium. Rather, there are barriers to entry across the banking sector: including direct subsidies for banks, price fixing, and undue influence over alternative arrangements.

The evidence suggests that inflation is a poor target for monetary policy in developing and emerging economies (Arestis and Sawyer, 2006, p. 849). Instead, high interest rates increase opportunities for profits from speculation, although some central banks are experimenting with alternatives to inflation targeting (Dombey, 2014).

The index methodology presented in **Chapter Six** offer the possibility of targeting the carry trade with monetary policy, supported by better regulatory data to guide fiscal and regulatory policy. For this to be successful, central banks would need political aims to be agreed, such as trade deficit reduction or liquidity support for a particular sector. In other words, the governance of central banks needs to resist regulatory capture by the financial sector (Palley, 2011, p. 1) and include representation from government (C. Goodhart, 2012a, p. 129) and other sectors.

Targetting a weighted carry trade index would signal two things. First, domestic rates will rise, or fall, in tandem with a known basket of currencies, and remove incentives to arbitrage between them. Second, it signals that domestic rates will rise, or fall, in response to private capital flows and exchange rate shocks. A positive carry trade target would signal expansionary monetary policy, and a negative carry trade target would signal contractionary monetary policy. This would seem to be an area for further research and exploration.

The concomitant management of interest and exchange rate risks also requires a broad range of supportive fiscal and macroprudential policy tools. During crises, the IMF has acknowledged a role for capital controls (International Monetary Fund 2010, p. 15) although the emphasis is asymmetric, with the burden falling on the recipient of inflows (Ostry et al. 2010, p. 5). The use of transaction taxes (Tobin, 1978 p. 157), particularly on destabilising flows, could be taken ‘out of the “index of forbidden thoughts”’ (Turner, 2010 p.29): in particular, transaction taxes could be applied to cross-currency lending and borrowing. The tax privilege afforded to debt could be reduced, to encourage equity investment. Other stabilisation policies include strict reserve requirements for borrowing in foreign currencies, active management of reserve assets, strict control over secondary debt markets, and incentive schemes aligned to the duration of debt contracts. In terms of fiscal policy, domestic inflation risks could be managed through wage and taxation policies. The most pressing challenge, for deficit countries, must be to develop policies that deal with stubborn trade deficits, and with the problems that a weak currency creates in terms of inflation pass-through.

An alternative monetary policy is to simply set interest rates at zero (Mosler and Forstater, 2004, p. 8) or, like the ECB, to sell liquidity at a positive interest rate and buy liquidity at a negative interest rate (European Central Bank, 2014). **Chapter Six** suggested two difficulties with zero rates. The first is that an interest mark-up on retail loans is income for banks (Godley and Lavoie, 2007, p. 401)²¹: banks must meet their costs and resolve defaults from this income. Second, if those retail banks are also speculating on carry trades, then the central bank is implicitly providing a guarantee at zero rates. In other words, a zero interest rate policy implies that there is no default risk (**Equation 7.3**). While this may be true for a sovereign country as a whole, there are profits and losses between sectors and countries. Instead, the interest rate needs to be sufficiently high, and retail banks need to retain sufficient interest income as reserves, that speculative losses do not trigger banking crises.

²¹ Equation 10.105 shows the profit of retail banks comprising interest income, plus income on reserves, less non-performing loans, less interest paid on deposits.

Central to the management of speculative losses is the separation of retail and investment banking, less reliance on debt contracts, and a lower legal status for derivatives (Stout, 2009, p. 30). More radical proposals include a restructuring of private debt (Benes & Kumhof, 2012, p. 6). The implications of the model in **Chapter Seven** are that the integrated banking model can profit whatever the financing decisions of the private sector, provided they have central bank support. If other sectors are speculating, investment banking strategies can profit from rising asset prices. Then, during asset price collapses, retail banking strategies rely on interest income to rebuild their balance sheets. Ring-fencing of banks in the UK (H.M.Treasury, 2012, p. 10) does not deal fully with the problems that arise from private information flows, price manipulation and financial speculation.

Carry trade indices offer the possibility to co-ordinate international liquidity. International liquidity began to tighten prior to the GFC (Becker and Clifton, 2007, p. 167) and the reversal in the carry trade in 2007 (**Figure 6.3**) was followed by deleveraging and sharp sell-offs in global bond and equity markets in 2008 (**Figure 8.2**). However, calls to reform global liquidity provision (D'Arista, 2009; United Nations, 2009; Xiaochuan, 2009) have largely fallen on deaf ears. The index methodology and better national accounting data would provide reformers with more information, and highlight areas where carry trades and shifts to liquidity provision are destabilising to the wider economy.

The evidence suggests that endogenous liquidity has largely been driven by offshore financing, underpinned by the accumulation of profits and trade deficits from countries like the UK and US. With these institutional arrangements, surplus and deficit countries must both adjust. Deficit countries must go beyond self-regulation of leverage via Basel III and deal with tax avoidance, and surplus countries must find other uses for trade surpluses that avoid offshore finance and trade sterilisation. This contradicts Keynes who wrote, in an era with capital controls, that 'the process of adjustment is compulsory for the debtor and voluntary for the creditor' (Keynes, 1980, p. 28) quoted in (Skidelsky, 2010, p. 8). When deficit countries do not agree to re-negotiate Bretton Woods or reform the IMS, the adjustment costs fall disproportionately on the surplus countries. There are signs that developing and

emerging economies are taking on these challenges, such as an agreement between Brazil, Russia, India, China and South Africa to commit 100 billion US Dollars to a 'BRIC Contingent Reserve Arrangement' (VI BRICS Summit, 2014).

Despite these positive signs, there is a trend for deficit country central banks to directly support the private sector through QE and revisions to money market operations, by accepting private debts as collateral (Draghi 2014; Yamaguchi 2013, p. 8-9; Swiss National Bank 2013b). This trend is beyond democratic scrutiny. **Figure 9.1** shows the extent to the balance sheets of central banks have shifted. Central banks in the UK, US, Russia, Japan, Europe and Switzerland all show a shift towards holding private assets as a consequence of bank bailouts and QE. China and Russia have continued to grow their ratio of foreign reserve assets through trade sterilisation, but only China has reported a shift towards holding public, domestic assets.

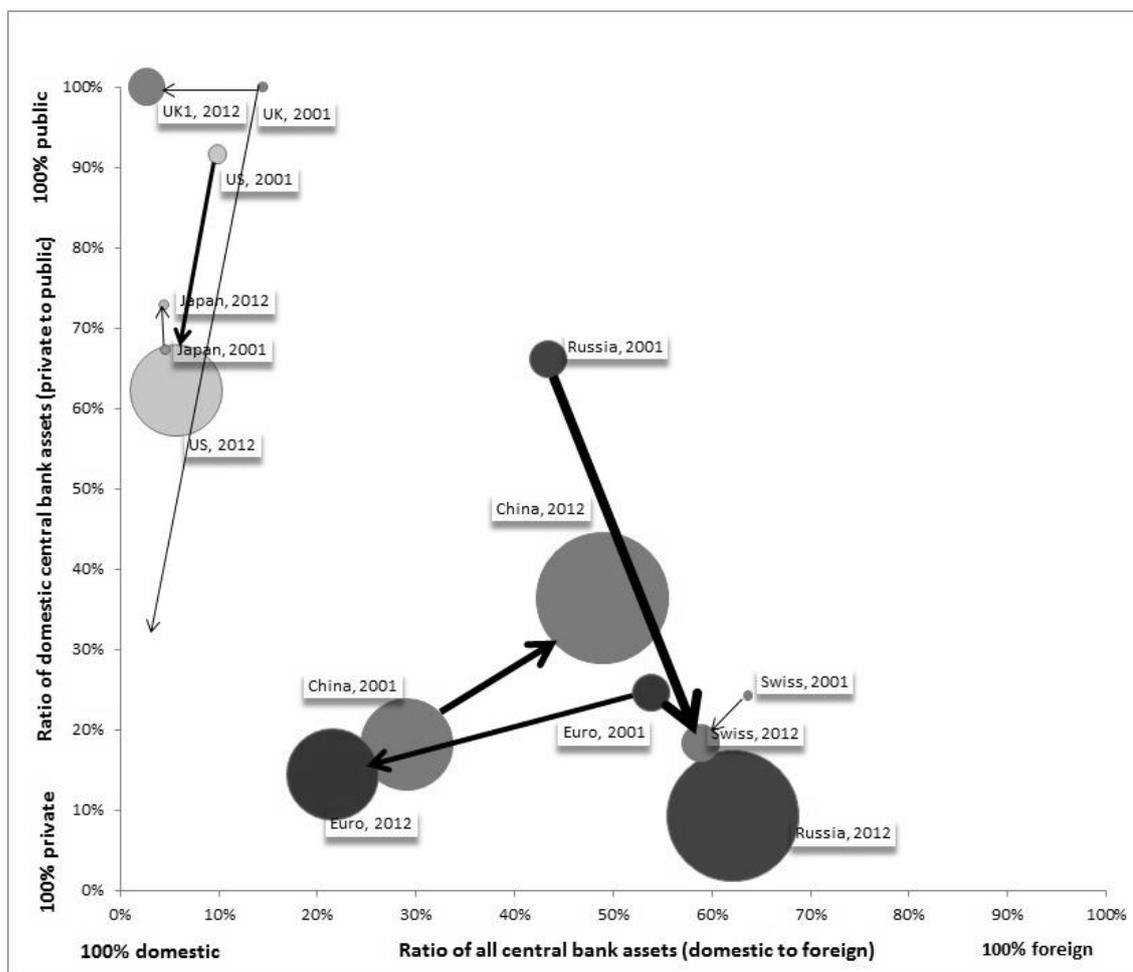


Figure 9.1. Changes in central bank orientation. Sources: International Financial Statistics, own calculations

This thesis has used a range of accounting techniques, including estimation methods, to better understand the winners and losers from the carry trade. The findings support the argument that central banks and exporters absorb foreign exchange losses, and that the financial accounts of deficit countries have been the main beneficiaries. Central bank support for the private, financial sector has continued to grow since the GFC. The trends in leverage, trade deficits and asset bubbles show no signs of self-correcting towards equilibrium. In short, the accounting approach to economics would seem to offer valuable insights into the carry trade.

The barriers to an accounting approach in economics are political, not technological. There is always the possibility that markets will self-correct; deficit countries will move

into surplus; businesses will distribute profits; international liquidity provision will be reformed; and the IMS will welcome the currencies of developing and emerging economies for settlement. There is the possibility that central banks will use their balance sheets to direct investment towards the new challenges of the 21st century, without the need for democratic oversight.

However, the evidence so far has been that the financial system is not tending towards any sort of equilibrium, but is 'inherently flawed, being prone to booms, crises and depression' (Minsky, 1969, p. 224). Under these conditions, there is a need for descriptive, empirical work using flow-of-funds and national accounting data. New techniques, such as the carry trade index methodologies in **Chapter Six**, will better inform public debate about international liquidity. Hopefully, this approach can be developed more fully.

Appendix 1: Already published material

Chapters 1 and 2	<p>Contain material from:</p> <p>Lancastle, N. (2011) Beyond the Washington Consensus: Accounting for Arbitrage Capital. Quadrangular PhD conference. Lancaster, UK.</p> <p>Lancastle, N. (2011) A critical analysis of the G5 carry trade as an investible index. First International Conference of COST Action, PhD School. Paris.</p>
Chapter 3	<p>Includes two encyclopaedia entries:</p> <p>Lancastle, N. (Forthcoming) Random walk. In: Rochon, L.P. and Rossi, S. (eds.) <i>Encyclopaedia of Central Banking</i>. Cheltenham, UK: Edward Elgar.</p> <p>Lancastle, N. (Forthcoming) Asset management. In: Rochon, L.P. and Rossi, S. (eds.) <i>Encyclopaedia of Central Banking</i>. Cheltenham, UK: Edward Elgar.</p>
Chapter 4	<p>Accepted as a conference paper:</p> <p>Lancastle, N. (2014) Rethinking market regulation: A proposal to integrate the National Accounts and expose foreign exchange risks. Conference on Data Standards, Information and Financial Stability. Loughborough, UK.</p>
Chapter 5	<p>Accepted as a conference paper:</p> <p>Lancastle, N. (2014) How should we regulate the carry trade? Ecobate 2014. Winchester, UK.</p>
Chapter 7	<p>Published as:</p> <p>Lancastle, N. (2012) Circuit theory extended: the role of speculation in crises. <i>Economics eJournal</i>. 2012(34). Available from http://www.economics-ejournal.org/</p>
Chapter 8	<p>Contains material from:</p> <p>Lancastle, N. (2012) Extended circuit theory: modelling the impact of government intervention. 6th International Dijon Conference. Dijon, France.</p>

Appendix 2: Mutual non-disclosure agreement

Date: DD MMM YYYY

Parties: NEIL LANCASTLE of UNIVERSITY OF LEICESTER, SCHOOL OF MANAGEMENT, KEN EDWARDS BUILDING, UNIVERSITY ROAD, LEICESTER, LE1 7RH

And

XXXX

1. Each of the parties to this Agreement intends to disclose information (the Confidential Information) to the other party for the purpose of ***advancing mutual research into the carry trade*** (the Purpose)
2. Each party to this Agreement is referred to as 'the Recipient' when it receives or uses the Confidential Information disclosed by the other party
3. The Recipient undertakes not to use the Confidential Information disclosed by the other party for any purpose except the Purpose, without first obtaining the written agreement of the other party
4. The Recipient undertakes to keep the Confidential Information disclosed by the other party secure and not to disclose it to any third party, except
 - a. in the case of XXXX, who need to know the same for the Purpose, who know they owe a duty of confidence to the other party, and who are bound by obligations equivalent to those in clause 3 above and this clause 4
 - b. in the case of NEIL LANCASTLE, as 'coded data' for use in his PhD thesis and any subsequent academic papers, such that no personal or company information is revealed except to the parties in this confidentiality agreement
5. The undertakings in clauses 3 and 4 above apply to all of the information disclosed by each of the parties to the other, regardless of the way or form in which it is disclosed or recorded but they do not apply to:
 - a. any information which is or in future comes into the public domain (unless as a result of the breach of this Agreement); or

- b. any information which is already known to the Recipient and which was not subject to any obligation of confidence before it was disclosed to the Recipient by the other party
- 6. Nothing in this Agreement will prevent the Recipient from making any disclosure of the Confidential Information required by law or by any competent authority
- 7. The Recipient will, on request from the other party, return all copies and records of the Confidential Information disclosed by the other party to the Recipient and will not retain any copies or records of the Confidential Information disclosed by the other party
- 8. Neither this Agreement nor the supply of any information grants the Recipient any licence, interest or right in respect of any intellectual property rights of the other party except the right to copy the Confidential Information disclosed by the other party solely for the Purpose
- 9. The undertakings in clauses 3 and 4 will continue in force indefinitely from the date of this Agreement
- 10. This Agreement is governed by, and is to be construed in accordance with, English law. The English Courts will have non-exclusive jurisdiction to deal with any dispute which has arisen or may arise out of, or in connection with, this Agreement

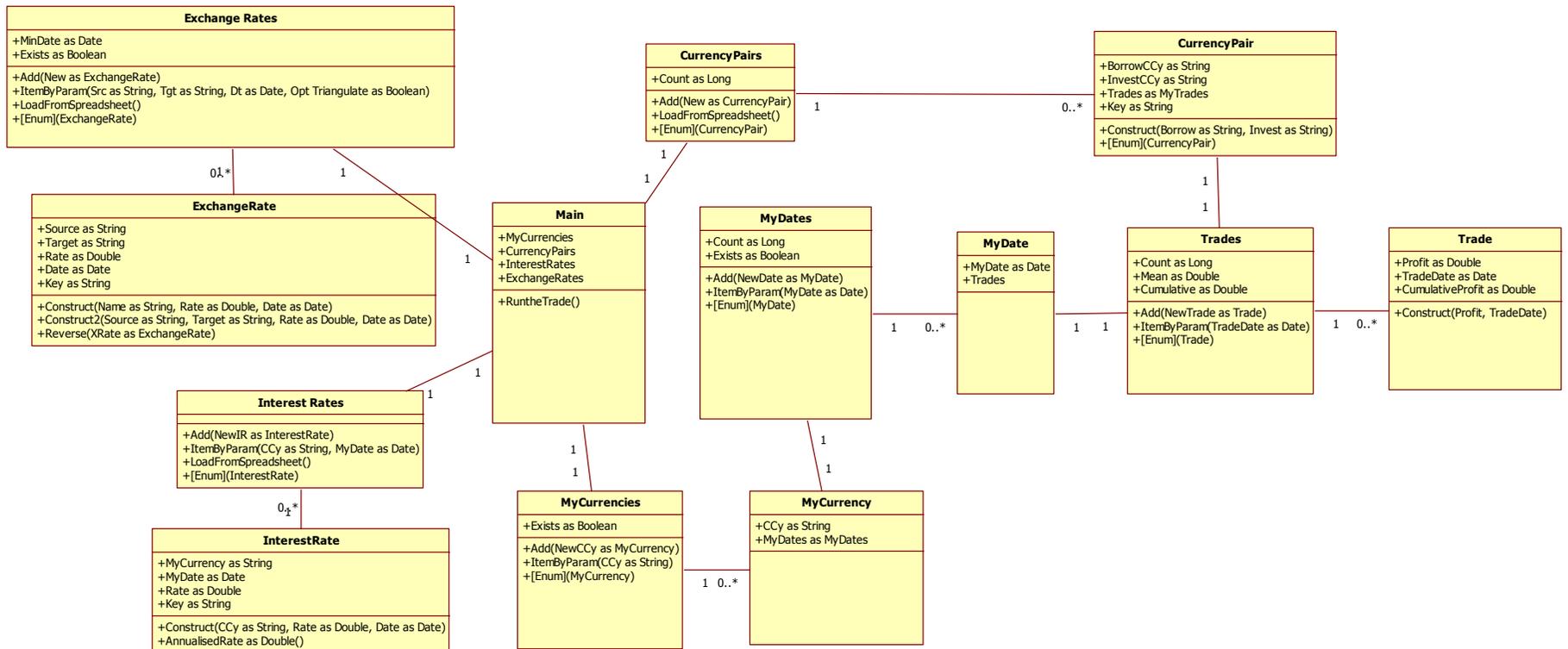
Signed by NEIL LANCASTLE:

..... (Signature)

Signed by XXX:

..... (Signature)

Appendix 3: Class diagram for simulation program



Appendix 4: Financialisation of new income streams

	Banks		Households		Government	Businesses		
	Current	Capital	Current	Inv	Current	Current	Inv	
Create loans	$-res$	$+res$	$-I_h$	$+S_h$		$-I_b$	$+S_b$	$S-I-$ $-\Delta L$
Loan payment	$+I_h \cdot r_L + I_b \cdot r_L$		$-I_h \cdot r_L$			$-I_b \cdot r_L$		0
Investment gains		$-S_h \cdot r_h$ $-S_b \cdot r_b$		$+S_h \cdot r_h$			$+S_b \cdot r_b$	0
Wages			$+factor \cdot I_b \cdot w_r$			$-factor \cdot I_b \cdot w_r$		0
Refinance	$-S_h \cdot r_h - S_b \cdot r_b$	$+S_h \cdot r_h$ $+S_b \cdot r_b$	$+S_h \cdot r_h$	$-S_h \cdot r_h$		$+S_b \cdot r_b$	$-S_b \cdot r_b$	
Wage, loan and investment taxes (including machinery)	$-T_b$		$-I_h \cdot r_L \cdot T_l$ $-factor \cdot I_b \cdot w_r \cdot T_w$ $-S_h \cdot r_h \cdot T_i$		$+I_h \cdot r_L \cdot T_l$ $+factor \cdot I_b \cdot w_r \cdot T_w$ $+S_h \cdot r_h \cdot T_i$ $+I_b \cdot r_L \cdot T_l$ $+(1 - factor) \cdot I_b \cdot T_c$ $+S_b \cdot r_b \cdot T_i$ $+2T_b$	$-I_b \cdot r_L \cdot T_l$ $-(1 - factor) \cdot I_b \cdot T_c$ $-S_b \cdot r_b \cdot T_i - T_b$		

Initial spending	$-I_h \cdot r_L - I_b \cdot r_L$ $+ S_h \cdot r_h + S_b \cdot r_b$ $+ T_b$		$+ I_h \cdot r_L$ $+ I_h \cdot r_L \cdot T_l$ $- \text{factor} \cdot I_b \cdot w_r$ $+ \text{factor} \cdot I_b \cdot w_r \cdot T_w$ $- S_h \cdot r_h$ $+ S_h \cdot r_h \cdot T_i$		$- I_h \cdot r_L \cdot T_l$ $- \text{factor} \cdot I_b \cdot w_r \cdot T_w$ $- S_h \cdot r_h \cdot T_i$ $- I_b \cdot r_L \cdot T_l$ $- I_b \cdot T_c$ $+ \text{factor} \cdot I_b \cdot T_c$ $- S_b \cdot r_b \cdot T_i$ $- 2T_b$	$+ I_b \cdot r_L$ $+ I_b \cdot r_L \cdot T_l$ $+ \text{factor} \cdot I_b \cdot w_r$ $- S_b \cdot r_b$ $+ S_b \cdot r_b \cdot T_i$ $+ I_b \cdot T_c$ $- \text{factor} \cdot I_b \cdot T_c$ $+ T_b$		0
Secondary government spending					$+ I_b \cdot r_L \cdot T_c$ $+ \text{factor} \cdot I_b \cdot w_r \cdot T_c$ $- S_b \cdot r_b \cdot T_c$	$- I_b \cdot r_L \cdot T_c$ $+ \text{factor} \cdot I_b \cdot w_r \cdot T_c$ $+ S_b \cdot r_b \cdot T_c$		0
Total spending	$- I_b \cdot r_L + S_b \cdot r_b$ $+ I_h \cdot r_L \cdot T_l$ $- \text{factor} \cdot I_b \cdot w_r$ $+ \text{factor} \cdot I_b \cdot w_r \cdot T_w$ $+ S_h \cdot r_h \cdot T_i$ $+ T_b$				$- I_h \cdot r_L \cdot T_l$ $- \text{factor} \cdot I_b \cdot w_r \cdot T_w$ $- S_h \cdot r_h \cdot T_i$ $- I_b \cdot r_L \cdot T_l$ $- I_b \cdot T_c$ $+ \text{factor} \cdot I_b \cdot T_c$ $- S_b \cdot r_b \cdot T_i$ $- 2T_b$ $+ I_b \cdot r_L \cdot T_c$ $+ \text{factor} \cdot I_b \cdot w_r \cdot T_c$	$+ I_b \cdot r_L$ $+ I_b \cdot r_L \cdot T_l$ $+ \text{factor} \cdot I_b \cdot w_r$ $- S_b \cdot r_b$ $+ S_b \cdot r_b \cdot T_i$ $+ I_b \cdot T_c$ $- \text{factor} \cdot I_b \cdot T_c$ $+ T_b$ $- I_b \cdot r_L \cdot T_c$ $- \text{factor} \cdot I_b \cdot w_r \cdot T_c$		M-X

			$-S_b \cdot r_b \cdot T_c$	$+S_b \cdot r_b \cdot T_c$	
Close circuit		$I_h = S_h$	$T = G$	$I_b = S_b$	$M=X$

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