A CRITICAL ANALYSIS OF FRACTIONAL RESERVE BANKING WITH REGARD TO REGULATORY ARBITRAGE

THOMAS DRAPER

The concept of a fractional reserve to be retained in any bank or lending institution is as old as money lending itself. The practical necessity of being able to maintain liquidity in terms of covering withdrawals was well understood by the early Jewish money lenders of renaissance Italian states. The statement "I would rather the worst debtor were indebted to me, than I to the best of creditors" is a saying still well known today amongst certain communities (Feldman, 2011). This paper will thus first examine the history of fractional reserve banking. Second explain the organisations currently operating in this field, including the Basel 1, 2, and 3 accords which have been developed as a result of continual problems. Third, it will explore the scope and inclusiveness of international organisations and agreements in regard to their efficacy. Finally conclusions will be drawn, and a formula derived, to calculate appropriate financial penalties for transgression. Lastly recommendations will be made for an effective enforcement system for a given fractional reserve.

HISTORY

The need to maintain an adequate reserve to pay back creditors has been established since the earliest days of money lending. In the following paper the word “bank” refers to any lender that lends largely borrowed money. The word “bankrupt” derives from the bench which was the workplace of a money lender being broken when he could not pay back his creditors (Mish, 2011). The development of an appropriate level of reserve has happened slowly. Firstly on an ad hoc basis, but later through the increasing regulation imposed by city and later nation states. The Code of Hammurabi, an ancient text from Babylonian law, is the first written code we have that regulates banking - of sorts. Certainly one individual considered possibly active as a banker by modern standards (Goetzmann, 2011a) was alive during the eighteenth century BC. Whilst there was some government control on debt levels (Goetzmann, 2011b), the issue of an appropriate reserve until modern times was left up to the individual lender. There was thus no incentive to maintain a prudent reserve.

The impact of the financial scandals of the Mississippi Company and John Law and the South Sea Bubble, were thought to be based solely on fraud and negligence and thus a private matter of the directors of the company and their clients. Certainly not on the failure of the former to keep a reserve that would prevent a possible run (Ferguson, 2008). The chartering of the Bank of England in 1694 and subsequent acts did not change this opinion. This appears to have been the mindset for many years. The principle established, for example, in the trial of the directors of Overend Gurney in 1866 (Swarbrick, 2012) was that the directors are not liable for fraud even in the case of a “grave error” based on reckless practice which caused the collapse of their bank.

The next major set of banking regulations of note was in the United States of America in 1863 (Hall and Kaufman, 2002a), but this also did not address the issue of an appropriate fractional reserve. In this period for bank depositors the principle of caveat emptor held sway, only amended by the judgement at specific trials. Even in modern times, the EC Directive No 77/780 enacted in 1977 and The Banking Act enacted in the United Kingdom in 1979 dealt only with the licensing and definition of banking, and played no part in regulating or specifying an appropriate percentage of fractional reserve. This was also the case for the first (1977) and second (1989) EU banking directives (Pilbeam, 2010a). Indeed it was not until the Basel agreements and the Basel banking accords that this subject was numerically specified.

THE ORGANISATIONS INVOLVED

Due to the piecemeal development of finance there are many organisations involved with influencing or regulating banking on a day to day basis, only some of them specifically deal with the fractional reserve. A clear distinction must be made between those whose opinions eventually have a statutory footing – for example the Bank of International Settlements (BIS) and trade interest bodies which seek to benefit their members but have no direct influence. These can be differentiated into International and national players.

INTERNATIONAL

The organisations involved are broadly divided into those with direct and indirect influence: those with direct, are the Financial Stability Institute (FSI), the Committee on the Global Financial System (CGFS), the Basel Committee on Banking Supervision (BCBS) and the International Monetary Fund (IMF). Those with indirect, are the International Banking Federation (IBF), the Institute of International Finance (IIF), the Association for Financial Markets in Europe (AFME), The Financial Markets Association (ACI), Asia Securities Industry and Financial Markets Association (ASIFMA), Securities Industry and Financial Markets Association (SIFMA), and lastly the bizarrely sounding International Organisation of Securities Commissions Organisation (IOSCO).

DIRECT

The Bank for International Settlements (BIS) and the Basel Committee on Banking Supervision jointly created the Financial Stability Institute (FSI) in 1999 to assist financial sector supervisors around the world in improving and strengthening their financial systems. The FSI's objectives are to promote sound supervisory standards and practices globally, and to support full implementation of these standards in all countries. It also provides supervisors with the latest information on market products, practices and techniques to help them rapidly adapt to innovations in the financial sector. It is hosted by the BIS which suggests some influence of one over the other – though the degree of such is obscure. The objectives are to help supervisors develop solutions to their multiple challenges by sharing experiences in seminars, discussion forums and conferences. It uses the resources of the BIS to assist supervisors in employing the practices and tools that will allow them to meet everyday demands and tackle more ambitious goals. The BIS has many committees which play a part in regulating the financial system. The FSI seems to have the greatest influence on the role of the fractional reserve (Bank of International Settlements, 2012a).

The Committee on the Global Financial System (CGFS) is a central bank forum for the monitoring and examination of broad issues relating to financial markets and systems. It is also hosted at the bank of International Settlements (BIS). It helps to elaborate appropriate policy recommendations to support central banks in the fulfilment of their responsibilities for monetary and financial stability. In carrying out this task, the committee assists central bank governors in recognising, analysing, and responding to threats to the stability of financial markets and the global financial system. The issue of general capital reserve levels is thus one of very much interest (Bank of International Settlements, 2012b).

The Financial Stability Board (FSB) was founded as the Financial Stability Forum in 1999 and is hosted by the BIS in Basel Switzerland. It has been established to coordinate at the international level the work of national financial authorities and international standard setting bodies and to develop and promote the implementation of effective regulatory, supervisory, and other financial sector policies. It brings together national authorities responsible for financial stability in significant international financial centres, international financial institutions, sector-specific international groupings of regulators and supervisors, and committees of central bank experts. Sometimes confused with the FSI which is also part of the BIS – the organisation is in fact completely different. The BIS is in fact a member of the FSB not vice versa. The FSB coordinates many financial institutions from many countries at a high level and is chaired by Mark Carney, Governor of the Bank of Canada. It is thus closely concerned with the issue of global financial security and fractional reserve banking. The FSI, CGFS, and FSB above and BCBS below are all based in Basel at Centralbahnplatz 2, Basel, Switzerland (FSB, 2012).

The Basel Committee on Banking Supervision (BCBS) is a forum for regular cooperation on banking supervisory matters. Its objective is to enhance understanding of key supervisory issues and improve the quality of banking supervision worldwide. It does so by exchanging information on national supervisory issues, approaches and techniques, with a view to promoting common understanding. The committee uses this common understanding to develop guidelines and supervisory standards in areas where they are considered desirable. It is best known for its international standards on capital adequacy; the Core Principles for Effective Banking Supervision; and the Concordat on cross-border banking supervision. This particular organisation is instrumental in the recent attempt to regulate fractional reserve banking. The committee's members come from Argentina, Australia, Belgium, Brazil, Canada, China, France, Germany, Hong Kong SAR, India, Indonesia, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, Russia, Saudi Arabia, Singapore, South Africa, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States. These are expected to increase in the near future. The present Chairman of the Committee is Mr Stefan Ingves, Governor of Sveriges Riksbank.

The committee encourages contacts and cooperation among its members and other banking supervisory authorities. It circulates both published and unpublished papers to supervisors throughout the world providing guidance on supervision. Contacts have been further strengthened by an International Conference of Banking Supervisors (ICBS) which takes place every two years. The committee is located at the Bank for International Settlements headquarters in Basel, Switzerland, and is staffed mainly by professional supervisors on temporary secondment from member institutions. In addition to undertaking the secretarial work for the committee and its many expert sub-committees, it stands ready to give advice to supervisory authorities in all countries. Mr Wayne Byres is the Secretary General of the Basel Committee.

The Current Basel regulations, overseen by the BCBS were developed by the Bank of International settlements (BIS) which in the latter half of the 20th century branched out from its initial role of settling reparations payments after the Great War and assumed a coordinating role, over many aspects of international banking regulation. One of which is now to determine the level of fractional reserves. The first banking accord was signed in 1988 (Hall and Kaufman, 2002b). In the years since the 2002 United Nations International Conference for Financing for Development produced the Monterrey Consensus (Griffith-Jones and Young, 2009) which stated the desirability of the Basel committee to expand to include as many countries as possible. At this time the impetus was really to increase the development potential of the economies included. There were many regulations enacted but a fractional reserve level was not specified. The Basel 1 (1988) agreement specified a bank must retain risk weighted assets of 8%. The Basel 2 accord (2004) reiterated an 8% level but stated that different levels had to be retained against different types of assets based on their perceived risk. Basel 3 (2010-11) included an element specifying the fractional reserve at 7% but with an allowance for reducing this by 2.5% to 4.5% in case of a “run” on the bank as long as no dividends could be paid until the buffer reached 7% again. There was also a countercyclical element to raise the requirement by 2.5% to 9.5% to restrict lending in an overheating market. A seasonal element of 2.5% for common equity was also added. This is always included in the total capital ratio and is always assumed to be needed as liquidity increases in many countries and peaks during the harvest and sale of the agricultural sector. In the Basel 2 agreement different types of capital had been given different nomenclature – tier 1 for the safest, tier 2 for that less so and so on. The Basel 3 agreement thus decided that the addition of all these various areas of capital should, to be adequate, produce a ratio of 8.5-11% against tier 1 capital (the safest) and 10.5-13% for the total capital. Enforcement was left up to national regulators (Bank of International Settlements, 2012c).

The International Monetary Fund (IMF) is an organisation that was created on July 22, 1944, at the Bretton Woods Conference and came into existence on December 27, 1945, when 29 countries signed the Articles of Agreement. It originally had 45 members. The IMF's stated goal was then to stabilise exchange rates and assist the reconstruction of the world's international payment system post-World War II. It is thus interested in fractional reserve levels as it often provides loans to countries with banking and bond crises. Countries contribute money to a pool through a quota system from which countries with payment imbalances can borrow funds with temporarily many attached conditions. Through this activity and others such as surveillance of its members' economies and policies, the IMF works to improve the economies of its member countries. It has access to very large funds and is thus instrumental in the current (2012) European “bail out” of highly indebted countries. The IMF describes itself as “an organisation of 188 countries (as of April 2012), working to foster global monetary cooperation, secure financial stability, facilitate international trade, promote high employment and sustainable economic growth, and reduce poverty.” The organisation's founding objectives are to promote international economic cooperation, international trade, employment, and exchange rate stability, including by making financial resources available to member countries to meet balance of payments needs. Its headquarters are in Washington, D.C. at 700 19th Street, N.W., Washington, D.C. 20431. It is closely related to the World Bank (International Monetary Fund, 2012).

INDIRECT

The International Banking Federation (IBF) was formed in March 2004 to represent the combined views of a group of national banking associations. As such the inception of this organisation predates the current financial crisis. The countries represented by the Federation collectively represent more than 18,000 banks with 275,000 branches, including around 700 of the world's top 1000 banks which alone manage worldwide assets of over \$31 trillion. The Federation claims to represent every major financial centre, and its members' activities in every time zone. This enables the Federation to function as an international forum for considering legislative, regulatory and other issues of interest to the global banking industry (International Banking Federation 2012). The statutory influence of this organisation is small, but it has considerable other influence due to its size and scope. It is an "umbrella association" that includes others such as the Basel Committee on banking Supervision (BCNS) and many others. It is based in London at Pinners Hall, 105-108 Old Broad Street EC2N 1EX.

The Institute of International Finance, Inc. (IIF) was created by 38 banks of leading industrialised countries in 1983 in response to the international debt crisis of the early 1980s. The IIF now serves its membership in three distinct ways: First, providing analysis and research to its members in emerging markets in regard to central issues in global finance. Second, developing and advancing representative views and constructive proposals that influence public debate on particular policy proposals, including those of multilateral agencies. It also makes comment on other issues that it feels are of importance - though with no statutory influence on the parties involved. Third, coordinating a network for members to exchange views and offer opportunities for effective dialogue among policymakers, regulators, and private sector financial institutions. The Institute's current 35-member Board of Directors is led by Chairman Douglas Flint; Vice Chairmen Roberto Setúbal, Walter Kielholz, Richard E. Waugh, and Marcus Wallenberg (also Treasurer of the IIF). The IIF's Managing Director is Charles Dallara, who has held the position since 1993. The headquarters is in Washington, D.C. at 1333 H St NW, Suite 800E, DC 20005-4770. In November 2010 the organisation opened its Asia Representative Office in Beijing at Fortune Resources International, South 17th Floor, 18 Taipingqiao Street, Xicheng District, 100032 (Institute for International Finance Inc., 2012). This is one of the many coordination and interest committees which have some influence over policy but little statutory power.

The Financial Markets Association (ACI) counts affiliated associations in some 65 countries across the world. ACI International acts as a focus of all of its local associations. Each national association serves the local financial community (mainly members, working with financial institutions or a financial services provider). The members are engaged directly within the financial trading or sales environment in the global financial markets. Being a non-commercial organisation ACI represents the interests of its individual members and provides a large international platform for networking in globalised markets. The individual members of this organisation provide market experience based on their financial day to day activities. It is based at 8, Rue du Mail F-75002, in Paris (The Financial Markets Association 2012). This institution appears to be a group that is orientated towards the benefits of networking opportunities by its members with no statutory footing.

The Asia Securities Industry and Financial Markets Association (ASIFMA) is a broadly based professional advocacy organisation that seeks to promote the growth and development of Asia's debt capital markets and their orderly integration into the global financial system (ASIFMA, 2012). ASIFMA works to develop more open domestic capital markets, standardised market practices and a stable and transparent regulatory environment that will help mobilise and redirect the region's financial savings to support Asia's continued economic growth and development. ASIFMA is the Asian regional member of the Global Financial Markets Association (GFMA). ASIFMA is based in Hong Kong at Units 610 and 611, Bank of America Tower, 12 Harcourt Road, Central Hong Kong (SIFMA 2012). Again - this organisation has growing informal influence, particularly with the current rebalancing of economic weight from east to west.

The Securities Industry and Financial Markets Association (SIFMA) expresses the shared interests of more than 650 securities firms, banks, and asset managers. SIFMA's mission is to promote effective and efficient regulation, facilitate open, competitive, and efficient global capital markets, champion investor education, retirement preparedness, and savings, and ensure the public's trust in the securities industry and financial markets. It represents its members' interests in the U.S. It has offices in New York City at 120 Broadway (35th floor) and Washington, D.C. at 1101 New York Avenue NW (8th floor). It is associated with the Asia Securities Industry & Financial Markets Association (ASIFMA). SIFMA is the American originator of the former, and both although projecting influence appear to have no statutory standing.

The Association of Financial Markets in Europe (AFME) concerns Europe's wholesale financial markets. It represents the leading global and European banks and other significant capital market players. It focuses on a wide range of market, business and prudential issues and offer a pan-European perspective, bringing to bear policy and technical expertise and constructive influence with European and global policymakers. It has a London office at St. Michael's House, 1 George Yard, London EC3V 9DH and another in Bruxelles at Square de Meeûs 38-40, 1000 (The Association of Financial Markets in Europe, 2012). There is another similar organisation called the Global Financial Markets Association (GFMA) which coordinates the activities of SIFMA, ASIFMA, and the AFE. Again these organisations are influential but with no direct statutory footing.

The International Organisation of Securities Commissions Organisation (IOSCO) has three main roles. First to cooperate in developing, implementing and promoting adherence to internationally recognised and consistent standards of regulation, oversight and enforcement in order to protect investors, maintain fair, efficient and transparent markets, and seek to address systemic risks. Second to enhance investor protection and promote investor confidence in the integrity of securities markets, through strengthened information exchange and cooperation in enforcement against misconduct and in supervision of markets and market intermediaries. Third to exchange information at both global and regional levels on their respective experiences in order to assist the development of markets, strengthen market infrastructure and implement appropriate regulation (OCIV-IOSCO, 2012). It is based in Spain at C/ Oquendo 12, 28006 Madrid. It is focused more directly on securities and this aspect of banking, and less on fractional reserve considerations.

NATIONAL

Each country has its own internal organisations which enforce banking regulation and the obligations of that nation to the international agreements that it has signed up to. The regulatory architecture in this area is thus very varied. If we examine for example United Kingdom the regulator is the Bank of England (BoE) and the Financial Services Authority (FSA). The FSA is to be replaced with the Prudential Regulatory Authority (PRA) and the Financial Conduct Authority (FCA) which will be again part of the BoE and report directly to its Financial Policy Committee (FPC).

The Bank of England is the central bank of the United Kingdom. Sometimes known as the 'Old Lady' of Threadneedle Street, the bank was founded in 1694, nationalised on 1 March 1946, and gained independence in 1997. Operating at the centre of the UK's financial system, the bank is committed to promoting and maintaining monetary and financial stability as its contribution to a healthy economy.

The bank's roles and functions have evolved and changed over its three-hundred year history. Since its foundation, it has been the government's banker and, since the late 18th century, it has been concerned with the banking system more generally. Its address is Threadneedle Street London, EC2R8AH. As well as providing banking services to its customers, the Bank of England manages the UK's foreign exchange and gold reserves. The bank has two core purposes - monetary stability and financial stability. To that end it has a Monetary Policy Committee (MPC) and a Financial Policy Committee (FPC). The bank is perhaps

most visible to the general public through its banknotes and, more recently, its interest rate decisions. The bank has had a monopoly on the issue of banknotes in England and Wales since the early 20th century. But it is only since 1997 that the bank has had statutory responsibility for setting the UK's official interest rate known as the Minimum Lending Rate (MLR) (Pilbeam, 2010b).

Interest rate decisions are taken by the Bank's Monetary Policy Committee of nine members. The MPC has to judge what interest rate is necessary to meet a target for overall inflation in the economy. The inflation target is set each year by the Chancellor of the Exchequer. The bank implements its interest rate decisions through its financial market operations - it sets the interest rate at which the bank lends to banks and other financial institutions. The bank has close links with financial markets and institutions. This contact informs a great deal of its work, including its financial stability role and the collation and publication of monetary and banking statistics. This is the role of the Financial Policy Committee (FPC).

The Bank of England produces a large number of regular and ad hoc publications on key aspects of its work and offers many educational materials. The Bank offers technical assistance and advice to other central banks through its Centre for Central Banking Studies, and has a museum at its premises in Threadneedle Street in the City of London, open to members of the public free of charge (Pilbeam, 2010c).

The Financial Services Authority (FSA) is due to be disbanded and its role taken over by other bodies. It is a quasi-judicial body responsible for the regulation of the financial services industry in the United Kingdom. Its board is appointed by the Treasury, although it operates independently of government. It is structured as a company limited by guarantee and is funded entirely by fees charged to the financial services industry. Its main office is based at 25 The North Colonnade, Canary Wharf, Greater London E14 5HS. There is another office in Edinburgh. When acting as the competent authority for listing of shares on a stock exchange, it is referred to as the UK Listing Authority (UKLA), and maintains the Official List. The FSA's Chairman and CEO are currently Lord Turner of Ecchinswell and Hector Sants, although on 16 March 2012 Sants announced his resignation, effective from the end of June that year (FSA, 2012a).

The Prudential Regulation Authority (PRA) is a future United Kingdom financial services regulator formed as one of the successors to the Financial Services Authority. It will be part of the Bank of England and will carry out the regulation of financial firms, including banks, investment banks, building societies, and insurance companies. It will be a quasi-governmental regulator, rather than an arm of the Government per se. It will formally come into being in early 2013. Andrew Bailey, will be the initial responsible official for banking supervision (FSA, 2012c). The organisation will move into 20 Moorgate, London, EC2R6DA.

The Financial Conduct Authority (FCA), previously known as the Consumer Protection and Markets Authority (CPMA), is a future agency of the Government of the United Kingdom, formed as one of the successors to the Financial Services Authority. It will regulate financial firms providing services to consumers and maintain the integrity of the UK's financial markets. It will focus on the regulation of conduct by both retail and wholesale financial services firms. Powers will include overseeing the design of financial products and being able to specify minimum standards and other requirements on products. The FCA will be able to ban financial products for up to a year before considering an indefinite ban; it will have the power to require firms to immediately retract or modify promotions which it finds to be misleading, and to publish such decisions. In early 2011, it was announced that the head of the FCA will be Martin Wheatley, previously chairman of Hong Kong's Securities and Futures Commission. In June of 2012 it was confirmed that John Griffith-Jones would become the non-executive chair of the FCA once the FSA ceases operations in 2013. Griffith-Jones will join the FSA board in September, 2012, as a non-executive director and deputy chair (FSA, 2012b). The organisation has no fixed address as yet.

SCOPE & INCLUSIVENESS OF INTERNATIONAL ORGANISATIONS & AGREEMENTS

PROBLEMS THE OLD SYSTEM GENERATED

The multiplicity and deficiencies in the governance of international regulatory institutions generated a serious weakness in financial regulation. While the system of informal information sharing, coordination, and communication witnessed some advances, the formal regulatory policies pursued were inadequate. There was a strong set of incentives to promote a financial services sector that competed with the need to manage risks within it. Countries such as the US and UK with extensive and sophisticated financial sectors had a large incentive to protect these existing standards. By under-regulating, systemic risk was allowed to build up. Many of the approaches taken, such as the drive toward quantitative, model-driven, and fundamentally microeconomic approaches to risk reflected a confidence that large banks could measure risk parameters themselves. This became a problem with a bank's assessment of their own risk in relation to various types of assets which the Basel 2 Agreement allowed them to measure themselves. The experience of the current recession has thrown these assessments clearly into doubt. Several major developing countries were indeed much more sceptical of such approaches, and were fearful of the pro-cyclical dimensions of the regulations developed (i.e. their capacity to exacerbate swings in the economic cycle). If they had been represented at the BCBS, their positions could have improved decision making and policy design.

RECENT REFORMS: PERHAPS STEPS IN THE RIGHT DIRECTION

In the midst of the recent global financial crisis, there have finally been significant expansions of the memberships of the global financial regulatory institutions. These developments demonstrate that under severe criticism, global financial regulatory institutions can be moved to reform their memberships. In the context of a major crisis in the core countries, collaboration of developing countries is needed to resolve the dilemmas of both legitimacy and effectiveness in these institutions. Following the Washington G20 Summit in November 2008 which encouraged the international financial standard setting bodies to review their governance, a number of important institutions expanded their memberships, particularly to developing and emerging countries. Table 1 summarizes these changes in the public regulatory institutions.

GLOBAL FINANCIAL REGULATORY BODY	PREVIOUS MEMBERSHIP	PREVIOUS MEMBERSHIP (DEVELOPING COUNTRIES)	TIME OF EXPANSION	EXPANSION TO INCLUDE MEMBERS FROM:
IOSCO	Australia, France, Germany, Hong Kong, Italy, Japan, Mexico, Netherlands, Canada, Spain, Switzerland, UK, USA	Mexico	February 2009	Brazil, India, China
BCBS	Belgium, Canada, France, Germany, Italy, Japan, Luxemburg, Netherlands, Spain, Switzerland, Sweden, United Kingdom, United States	None	March 2009	Australia, Brazil, China, India, Korea, Mexico, and Russia
FSF/B	Australia, Canada, France, Germany, Hong Kong, Italy, Japan, Netherlands, Singapore, Switzerland, UK, USA	None	March 2009	Argentina, Brazil, China, India, South Korea, Mexico, Russia, Saudi Arabia, Turkey, Spain, European Commission

Table 1 : Changes in Public Regulatory Institutions

CONCLUSIONS

A global financial regulator is essential to help provide the regulatory coordination needed for pursuing the global public good of financial stability. Both academics and some market actors have long called for such an institution (Eatwell & Taylor, 2000). As stated by Perspectives on the Governance of Global Financial Regulation in item 23 of their report, "with regard to comprehensiveness, in order for regulation to be efficient, it is essential that the domain of the regulator is the same as the domain of the market that is being regulated. The crisis has shown that globalized private financial players are supported by increasingly internationalised lender of last resort facilities. Without stronger international financial regulation to complement this, moral hazard will significantly increase once again as financial activity and risk-taking will grow rapidly in areas where international regulatory gaps exist, but there is implicit or explicit coverage by lender-of-last resort facilities. Perhaps more importantly, regulatory arbitrage will take place where regulatory gaps exist" (Griffith-Jones, 2009).

In order to stop regulatory arbitrage in the area of fractional reserve banking there is a need not only for a single regulator and agreement on general accounting principles, but agreement about the nature and scale of penalties for transgressing the limit of the financial buffer. Without these any system will be largely ineffective. Penalties will usually take the form of a fine. In current operating systems there is no consistency in the scale of the fines across national boundaries, and indeed all enforcement is national. The problems in this case are that the incentive to transgress the buffer ratio should be reduced to zero, without excessively reducing the liquidity in the banking system more than is required, or indeed forcing a certain bank into insolvency with the result of reducing competition in the total banking market.

As finance flows increasingly internationally, seeking optimum returns and least regulation, it can be viewed as an open access resource. A conceptual formula produced by Garrett Hardin (1915-2003) in his paper "The Tragedy of The Commons" to describe this may be useful (Hardin, 1968). This can be adapted to:

$$I = A - E - X - P(X - X_{nc}) - X - TLC$$

Where:

I = The incentive to breach the enforced fractional reserve.

A = The aggregate total return on investment derived or reasonably expected (note $A \geq 0$ for there to be any chance at all of a positive incentive)

E = The amount of money that the enforced fractional reserve is depleted below its minimum mandatory level.

P = The penalty for transgression of limit of fractional reserve level (note $P \geq 0$)

X_{nc} = The number of banks who are not cooperating with a regulator and not honestly following the same fractional banking level.

X = The total number of banks in the system.

TLC = The Total Legal Cost including auditing and investigation costs by the regulator.

If we assume the incentive I should = 0 then we can remove this term, and transpose for what the most appropriate financial level of penalty should be:

$$P = X - (X - X_{nc}), A - E - X - TLC.$$

A worked example of a bank that makes an aggregate total return on an investment of 300 million dollars ($A=300$) by exceeding the fractional reserve level of 200 million dollars ($E=200$) in a system of 1000 banks in total ($X=1000$) where 500 do not cooperate with fractional reserve rules ($Xnc=500$) and the total legal costs are 10 million ($TLC=10$) would yield a penalty of 579.6 million to render the incentive to cheat zero. This would be in a system where half the banks do not cooperate with the rules. In the case of exactly the same sums of money where out of 1000 banks in total (X) 100 do not cooperate (Xnc) the resulting fine would be 321.999 (recurring) million. This is because the best proxy for the bank which is transgressing being caught is the number of banks in the system that will cooperate with regulators against the number who will not. There will usually be another bank or shadow bank which is receiving the funds and although it may not know that these come from an institution that exceeds the fractional bank limit, it is another source for investigation of a suspect bank. This is shown in the $P=,X-Xnc.$ function at the start of the equation. The above expression thus acts as a penalty multiplier. The size of the penalty is inversely proportional to the probability of being caught based on the number of operators in the system that are willing to cooperate with investigations. The second part $,A-,E-X.-TLC.$ specifies that the amount the transgressor should pay is all of the revenues returned on the investment minus the risk to himself in terms of his own expenditure beyond the fractional reserve limit. The $-,E-X.$ function ensures he pays the proportion of this money used beyond the limit spread on all others but not the little portion that he bears himself as he would be effectively punished twice. Total Legal Costs (TLC) are borne personally and would include the costs of any investigation or audit required if an infringement was discovered. They will thus always be greater than 0. If the bank makes a loss on the money that it has exceeded the fractional reserve by, this is not relevant to the penalty, as A is the total amount of revenue returned on the investment that breaks the fractional reserve not the profit and must be greater or equal to 0. In the case where P would be negative the penalty would be zero. In this case borrowing well below the fractional reserve limit and not making as much money back as was borrowed together with the offsetting factor $-,E-X.$ and $-TLC$, the bank will already have lost money and in some sense has "penalised itself". It will have to pay its legal costs in addition. There is therefore no point fining it further. The object is not to destroy.

The equation makes some assumptions. First that bankers are rational and do not want to make a quick profit at the risk of their whole bank or banking sector collapsing and having to be bailed out. Second that an effective system of monitoring and control exists in most of the banking sector to make enforcement useful and that the financial information to use the formula is made available to regulators. This information needs to be used to derive a meaningful P function multiplier as explained above. With adaptations the formula can in fact be used to act as a rational basis to disincentivise any open access resource activity.

Other problems will arise, however with any stochastic system only a portion of which is restricted. If it is assumed that there exist in the whole banking sector (X) banks that are not abiding by the fractional banking level (Xnc) - such as those based in countries that are beyond the jurisdiction of the system - these banks will be more profitable and eventually grow and come to dominate the system. They will even benefit from the stability provided to the system by the less profitable banks that abide by the rules. For this, perhaps additional rules need to be suggested.

RECOMMENDATIONS

The current structure of international regulation is fragmented into many overlapping organisations which have been shown above. Matters are further complicated by the fact that enforcement is left up to national bodies with no clear consistency of penalty. This gives rise to an inherently unstable fractional reserve banking system. Clearly a respected and empowered central organising body is required as Eatwell & Taylor et al. have described. The United Nations is an organisation concerned primarily with the peace and stability of the world. It is known that there is a correlation between global recession and conflicts between nations and interestingly also suicides, indicating personal torment (Counihan, 2012). This is not the case

during periods of positive growth. The United Nations has various standing committees, and it seems sensible that one is created to enforce international banking regulation. The penalty for not cooperating with an efficient audit system of the regulations that were enforced would be eventual removal from the UN and or trade sanctions. This would isolate a bank from access to useful sources of capital and any reserve capital held in case of liquidity crisis by the international regulator. The penalty for noncooperation with audit should be larger than any penalty for breaching the fractional reserve limit. In this way it will always make financial sense to cooperate with the regulatory system. Care should be taken to give an institution that did cooperate and had breached the fractional reserve, a short space to rectify the situation before a penalty was applied. Those institutions that were not found to have breached their fractional reserve limit should not have to pay their legal and auditing costs. These should be paid from the fines of transgressing firms. To ensure a system with no possibility for regulatory arbitrage, the penalty equation should be given to the judges of each national jurisdiction in order to calibrate penalties on the same basis. They may have to contact the central regulator to obtain the current multiplier on the penalty (P) function. The system should grow at least as fast as the creation of new banks to stop the influence of unregulated banks becoming dominant.

This method, if followed, could reduce the scope for regulatory arbitrage and leakage of capital into inherently less stable banking systems with lower fractional reserve limits. It must be centrally recognised that to deter an institution is always better than to prosecute it. The penalty for breaking a fractional reserve should therefore be uniform throughout the banking system and well known to it. The formula included provides a reasonable basis to inform the financial penalty set by a central regulator and should be globally enforced. Whilst this may seem draconian, the near catastrophic consequences that can arise from lack of integration are all too obvious. ■

REFERENCES

- ASIFMA. ASIFMA About us: Mission and Objectives (2012). Available at: <http://www.asifma.org/about.shtml> (Accessed: 23 August 2012).
- Bank of International Settlements (2012a) Available at: <http://www.bis.org/fsi/aboutfsi.htm?ql=1> (Accessed: 23 August 2012).
- Bank of International Settlements (2012b) Available at: <http://www.bis.org/cgfs/index.htm>. (Accessed: 23 August 2012).
- Bank of International Settlements (2012c) Available at: <http://www.bis.org/bcb/bcbs/> (Accessed: 23 August 2012).
- Counihan, P. (2012) Irish Central. Available at: <http://www.irishcentral.com/news/Irish-suicide-numbers-show-sharp-rise-as-recession-takes-its-toll-159343285.html> (Accessed: 22 August 2012).
- Eatwell, J. & Taylor, L. (2000) "Global Finance at Risk: The Case for International Regulation." New York: The New Press.
- FSA. About the FSA (2012a) Available at: <http://www.fsa.gov.co.uk/about> (Accessed: 23 August 2012).
- FSA. Regulatory Reform (2012b) Available at: http://www.fsa.co.gov.uk/about/what/reg_reform/background (Accessed: 23 August 2012).
- FSA. Prudential regulatory Authority: the Future approach to banking supervision (2012c) Available at: http://www.fsa.co.gov.uk/about/what/reg_reform/background. (Accessed: 23 August 2012).
- FSB (2012) Available at: <http://www.financialstabilityboard.org/about/overview.htm> (Accessed: 28 August 2012).
- Feldman, B. (2011) The Jewish Wisdom Database (Jewish Proverbs, Quotations, Sayings) Available at: <http://www.jewish-wisdom.com/index.php?h=a&a=0&p=0&t=34&l=125&s=submit=more> (Accessed: 20 Aug 2012).
- Ferguson, N. (2008) "The Ascent of Money: A Financial History of the World." New York: The Penguin Press.
- Goetzmann, W. (2011a) "Dumuzi-gamil" under heading "The Merchants of Ur" Viking – Yale. Available at: <http://viking.som.yale.edu/will/finciv/chapter1.htm> (Accessed: 20 Aug 2012).
- Goetzmann, W. (2011b) "Government Regulations and the Great Crash" Viking – Yale. Available at: <http://viking.som.yale.edu/will/finciv/chapter1.htm> (Accessed: 20 Aug 2012).
- Griffith-Jones, S. (2009) Perspectives on the Governance of Global Financial Regulation. Available at: www.Stephanygj.net/papers/Governance-Global-Financial-Regulation.doc (Accessed: 21 August 2012).
- Griffith-Jones, S & Young, K. (2009) "Reforming governance of international financial regulation; have the G20 done enough?" Oxford: Oxford University Press.
- Hall, M & Kaufman, G. (2002a) "International Banking Regulation" presented in "Structural Foundations of International Finance" held at St. Mary's University, Halifax, Nova Scotia on May 10-11, 2002, pp. 14-15.
- Hall, M & Kaufman, G. (2002b) "International Banking Regulation" presented in "Structural Foundations of International Finance" held at St. Mary's University, Halifax, Nova Scotia on May 10-11, 2002, pp. 2-3.
- Hardin, G. (1968) "The tragedy of the commons", Science. 162, 1243-48.
- International banking federation. About IbFed. (2012) Available at: <http://www.ibfed.org/about-ibfed> (Accessed: 23 August 2012).
- International Monetary Fund. About the IMF2. (2012) Available at: <http://www.imf.org/external/about.htm> (Accessed: 23 August 2012).
- Mish, F. (2011) "Bankrupt " Definition and More from the Free Merriam-Webster Dictionary. Available at: <http://www.merriam-webster.com/dictionary/bankrupt> (Accessed: 20 August 2012).
- Pilbeam, K. (2010a) "Finance and Financial Markets." London: Palgrave Macmillan. pp. 472-473.
- Pilbeam, K. (2010b) "Finance and Financial Markets." London: Palgrave Macmillan. pp. 469.
- Pilbeam, K. (2010c) "Finance and Financial Markets." London: Palgrave Macmillan. pp. 76.
- The Association of Financial Markets in Europe. The Mission. (2012) Available at: <http://www.afme.eu/About/Mission.aspx>. (Accessed: 23 August 2012).
- OCIV-IOSCO. About IOSCO. (2012) Available at: <http://www.iosco.org/about.html> (Accessed August 23rd 2012).

The Financial Markets Association. The Network. (2012) Available at: <http://www.aciforex.org/gb/the-network-146.cfm>. (Accessed: 23 August 2012).

The Institute of International Finance Inc. About IIF. (2012) Available at: <http://www.iif.com/about/> (Accessed: 23 August 2012).

SIFMA. About. (2012) Available at: <http://www.sifma.org/about/> (Accessed: 23 August 2012).

Swarbrick, D. (2012) "Swarb.co.uk-for law" "Overend Gurney & Co (Grissell's case)" Available at: <http://swarb.co.uk/in-re-overend-gurney-co-grissells-case-1866/> (Accessed: 12 August 2012).

TABLES

Table 1 "Recent Membership Reforms since the G20's Call for Reform." Source: Griffith-Jones, S & Young, K. (2009) "Reforming governance of international financial regulation; have the G20 done enough?" Oxford: Oxford University Press. P. 3.