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Abstract

This article considers the body of work which Andrew Haldane has published since the onset of financial crisis. It draws a distinction between two kinds of criticism in that work: Haldane's *interference* through political arithmetic on the costs of finance and Haldane's *strategic criticism* through re-conceptualisation of the financial network using metaphors drawn from the life sciences. His readers have mainly focused on Haldane's strategic criticism through concept and metaphor while neglecting his political arithmetic and empirics on the costs of finance. But this article argues that Haldane's political arithmetic on costs is an important intervention when the finance sector is deflecting reform with a trade narrative about the social benefits of finance.

Introduction: Haldane's Gambit

The financial crisis that began in August 2007, and deepened after September 2008 with Lehman's collapse, immediately raised questions about a problem of knowledge failure involving banks and regulatory institutions. The subsequent period has been one of 'knowledge repair' with many different and competing explanations of why knowledge failed and how we should reconceptualise and measure anew. By 2012, the political will for reform is diminishing as, in all major jurisdictions, regulators and politicians seek compromise with the banks who now emphasise their social value, just a few years after they wrecked the financial system at huge cost to taxpayers. Against this background, Andrew Haldane is a radical and energetic public intellectual offering fundamental re-conceptualisation and imaginative use of empirics which change and challenge our understandings of financial markets and the role of banking in society.

Our argument in this paper is that Haldane's radicalism has so far taken two forms which represent different kinds of critical responses to crisis. First, in what we might term his political arithmetic papers, Haldane's criticism takes the form of tactical interference with the narratives about the social value of finance used by the financial services industry to deflect demands for substantial reform of finance. The political arithmetic is empirically resourceful and conceptually open; not obviously rooted in any one theoretical perspective. Second, in what might be called his 'big concept' papers, Haldane's criticism takes the strategic form of a problem shift towards 'rethinking the financial network' , drawing on metaphor from epidemiology and ecology, to make a substantive proposal for paradigm shift and the creation of new maps and control technologies which could prevent and manage future crisis. Haldane's political arithmetic is about empirical challenge and blocking or countering the claims of finance, while Haldane's strategic criticism is about fundamental re-conceptualisation to facilitate the technocratic mastery of financial markets.

The political arithmetic and the strategic re-conceptualisation can be thought of as Haldane's two gambits. Interference through empirically resourceful political arithmetic is a kind of conversational gambit which responds to and challenges bankers' stories about the social value of finance: Haldane's empirical listing of the costs of finance encourages the pragmatic belief that society has much to gain and little to lose from coercive re-reregulation of finance (while the bankers' stories about benefits have the opposite effect). Strategic criticism is more like a gambit in the chess playing sense, where something is sacrificed to obtain positional advantage. In this case Haldane sacrifices the old paradigm of understanding markets using imagery taken from the physical sciences; then proposes a move into biology so that the financial crisis can be understood as the behaviour under stress of a complex adaptive network; and does so in the hope that this re-conceptualisation will open new possibilities of control.

If we consider Haldane's ambition and fecundity, we are reminded of the old liberal collectivist masters, Keynes and Beveridge. But Haldane as public intellectual operates in a different and more technocratic mode. Presently he is part of a wider revolt of the establishment technocrats in the UK where demands for radical banking reform have been led by elite figures, like Mervyn King, Director of the Bank of England and Adair Turner, chair of the Financial Services Authority. Haldane himself is a long standing Bank of England staffer, who is currently Executive Director of Financial Stability. Like his technocratic peers, Haldane now defends the public and the social against the sectional interests of finance but without any reference to classic liberal collectivist redistributive objectives. Partly in consequence, Haldane has little profile with the general public and, as far as we know, his name was never mentioned by any front bench politician in the general election campaign of 2011.

But Haldane's limited public profile contrasts with his standing as the Bank of England's radical house intellectual who, through his interventions after the crisis, has become the darling of the intelligentsia. Unsurprisingly, it is Haldane's strategic criticism which has captured the attention of academics, journalists and other social commentators. As we see from Thomson (2012) and Cooper's (2012) contribution to this section, Haldane's strategic criticism is a congenial object because it allows intellectuals to calibrate their own positions on finance against his and to situate Haldane in the complex field of the history of economic thought. Equally, Haldane's interference through political arithmetic has been neglected. This is in part because there has been an algebraic revolution in mainstream economics Many of those who resisted algebra did so by taking a cultural and constructionist turn and would prefer to comment on conceptualisation rather than do six tables and a commentary in an applied economics style which went out of fashion in the 1980s. Given the current framing of economic knowledges, Haldane's political arithmetic will be marginalised.

Against this, our paper argues that the eclipse of Haldane's political arithmetic by his more conceptual work on financial networks, is unfortunate for two reasons. First we argue that political arithmetic is salient to the ongoing political struggle for reform. Empirical work which calculates the magnitude of costs imposed by finance on the state is important because it challenges the narrative of benefits from the distributive coalition around finance (DCAF). Second we are sceptical about Haldane's technocratic project of mapping the financial network. Specifically, we doubt whether Haldane's problem shift will translate into a workable control technology, when it ignores the reflexive and reactive relation between cartographer and the object being mapped ('the observer effect'), in a world where financial innovation takes the form of bricolage.

The article which advances these arguments is organised in a relatively straightforward way. The first section of the paper is not about Haldane but about the political context as financial services practitioners, industry associations and other believers develop their narrative about the social benefits of finance. We term this kind of discourse, following Althusser and Balibar (1970), a 'lacuna discourse' which is heavily framed and leaves significant gaps. A second section then turns to Haldane's political arithmetic and shows how, by shedding light on these gaps, Haldane's political arithmetic on the costs of finance challenges dominant discourses and supports the case for radical re-regulation whose object is the shrinking of finance. A third section then examines Haldane's strategic criticism where a new metaphor-driven concept of the financial network is the basis for re-visualising system risk and proposing a new control technology. Here we highlight problems with translated and metaphor-driven concepts like 'network', before questioning the possibility of controlling finance if innovation treats regulation as input rather than constraint.

1: The distributive coalition's story (continued)

> There was a period of remorse and apology; that period needs to be over. We need our banks willing to take risks, to be confident and to work with the private sector in the UK to create jobs and improve economic growth… (the UK) is the place we want to succeed, it is great for business, for attracting talent and raising capital… Our view is that the reason why we need (complex banking organisations) is for jobs and economic growth. The reason why we need banks such as Barclays is that our clients are bigger. Our clients are more international (Diamond, B. 2011a)

> A few banks got into difficulty but the majority did not…it is surely necessary to recognise this. The UK is a large international centre for banking and this creates many jobs and contributes much in taxes. (Knight, A. 2011a)

In line with our general argument, we begin not with economists or finance academics or regulators and policy makers but with leading bankers and the head of their trade association. In previous work, we have argued that the distributive coalition around finance (DCAF, hereafter) responded to crisis and tried to pre-empt reform by emphasising the 'social value of finance' to the UK economy (CRESC 2009, Engelen et al., 2011) . In a UK context, the key documents are the Wigley (2008) and Bischoff (2009) reports which claim :

> The UK international financial services sector…plays a vital role in the wider non-financial services economy, in promoting growth and productivity through investment and the provision of business finance. It provides a large share of tax revenues, generates jobs, stimulates technological innovation and creates skills that can be transferred to other sectors
>
> (Bischoff 2009, p.31; see also Wigley 2008, p. 16).

The more recent quotes from Bob Diamond and Angela Knight show how the story is being updated by media repetition in ways which seek to persuade or pressure policy makers into resisting the implementation of reforms that would constrain the activity in a world where senior Coalition politicians are increasingly conciliatory towards finance.

The DCAF's narrative follows a familiar formula which relies on several rhetorical devices. First, usually when opening discussion, the DCAF narrative acknowledges error in a way that Barthes (1957) would term 'inoculation': that is, the acceptance of guilt over some small misdemeanour (or evil, as Barthes puts it) which serves to disarm critics and shift the focus from more deep-seated problems. The second device involves repetition and assertion in soundbite form which endows an object with positive characteristics through an association with benign outcomes: in this case the connection is between financial sector activity and UK outcomes of GDP growth, taxation income and job creation. Third, with the positive social benefits of finance asserted, the imagined collective is mobilised against new regulatory threats to the banking sector which promise to undermine their good work.

Inoculation, in the Barthesian sense, is an important device because the pain of crisis continues with expenditure cuts, so that bankers cannot credibly take a position which denies all responsibility. Inoculation means (partial) responsibility is accepted, which signals balance and reasonableness while closing off consequences. In the Diamond quote which opens this section, this is done by acknowledging that there was a time when apology was appropriate but we should now move on by 'putting the blame game behind us' (Diamond 2011b). Angela Knight similarly acknowledges the failings of 'a few banks', but then goes on to assert that the majority did not fail. This immediately restricts debate to one of poor management in individual institutions rather than broader systemic problems rooted in the nature of the activity. The inoculation device is therefore important because it can disarm some sceptics and draw others into a discussion where the parameters are preset.

But a narrative must also have a dominant theme or refrain, and this is provided by the assertive linking of finance and UK growth, jobs and tax-take. This was, of course, the central point made over several pages in the Wigley and Bischoff reports. But, recent examples, after much public relations coaching, increasingly take the form of soundbite as the connections are asserted over two to three short sentences, and repeated over and over again. In Diamond's evidence to the Treasury Committee, for example, he makes the key connection no fewer than ten times. In her many media appearances Angela Knight also repeats this basic link between finance and UK GDP growth, tax and jobs. Repetition not elaboration is the tactic, and at its most extreme, precision is sacrificed in the interests of puffery. Lord Digby Jones, now Chairman of the International Business Advisory Board at HSBC and an ex-advisor to Barclays Capital, in a Radio 4 interview in September 2010 argued that financial services contributed 24% of all taxes paid in the UK and revised this down to a still substantial 20% in

a later interview (Radio 4, January 2011). This figure was quite different to the most optimistic estimate of 11.2% by Price Waterhouse Coopers (2010). When pressed by Radio 4, Jones could not present a source for his claims.

What about the social costs of finance? In an earlier discussion of Bischof and Wigley (CRESC 2009), we pointed out that the discussion of costs were absent in their reports which, in a rather peculiar kind of arithmetic, added the many social benefits of finance without subtracting any costs. In the same report we also pointed out that the IMF and others had made authoritative calculations of the direct and indirect costs of bailout which substantially offset the taxes paid and collected by finance in the five years before 2007. The broad arguments about social costs have still not been engaged by the DCAF, but are sidestepped through a narrow discussion of the resale value of the State's equity stake in banks like Northern Rock, Lloyds and RBS when they are finally returned to the market. The good news is that the tax payer may well make a profit on this modest part of the overall bailout and support deal. Thus a supportive Telegraph editorial argued that 'the actual cost to the taxpayer of the bailout of the banks will be zero. If anything, the taxpayer will make a profit on their stakes' (Telegraph 29 Jan 2011). Trade magazine 'The Banker' went further and claimed the taxpayer could make a £19 billion return on its investment as share prices advance, plus £2 billion in fees for guaranteeing bank bonds, £5 billion from fees for the Asset Protection Scheme (APS) and £1 billion in loan fees. From this perspective the crisis could be represented as a hidden boon to the Treasury and the UK taxpayer more broadly.

The conflation of the public interest with those of the financial sector is important as banks can then legitimately ask for a regulatory environment in which they can thrive and resist virtually any proposal that threatens to dint their returns. Thus the British Bankers Association's (BBAs) response to the UK's proposed introduction of 'super equivalent' measures above those set by the EU was framed as a dangerous threat to finance's social mission of singlehandedly rebuilding the UK economy:

> Introducing national measures on a super-equivalent basis would deter new entrants and would also detract from the global programme and have the potential of placing the UK at a competitive disadvantage, impeding its banks' ability to support the economic recovery and impair the attractiveness of the UK as an international financial centre
>
> (British Bankers Association 2011, p.5);

and later, '… The implementation of new standards… flows directly through to an impact on the economy and economic growth.' (Knight 2011b).

The resistance to regulation ('in the public interest') is allied to a separate claim that radical interventions are not necessary because banks have voluntarily put their houses in order:

> the changes from top to bottom within the industry have ensured the risks are well controlled and all banks have put recovery and resolution plans in place to answer the too-big-to-fail question and so safeguard customers . . . of any future failure.
>
> (Knight 2011c).

For that reason radical reforms like Glass-Steagall attempts to break up retail and wholesale operations in large financial combines are quite unnecessary, and may even increase fragility:

> issues concerning SIFIs (systemically important financial institutions) should not be expressed purely, or even principally, as a function of size….There are grounds for believing that universal banks are better placed than less diversified banks to maintain the supply of credit during systemic banking crises and that universal banks provide a

stabilising factor during local financial turmoil….It cannot be said therefore that size or diversity lead to failure

(British Bankers Association 2011).

The quotations above come mainly from Angela Knight and the British Bankers' trade association, but increasingly they are carried over into much Coalition government discussion of banking policy, even though (or because) some senior Liberal ministers like Vince Cable are openly critical of the banks. The end result is regulatory closure.

The key political player on banking reform is not Vince Cable but the Chancellor George Osborne whose opening address at Davos in 2011 eerily echoed Diamond's line a fortnight before to the Treasury Select Committee. Osborne argued there was a 'need to move on from banker bashing', that London was the 'undisputed home' of financial services and that UK financial services should play a major role in a growth agenda driven by lending to SMEs, contributing to the Exchequer in the process (Osborne, 2011). The 'moving on' rhetoric is now coupled with a kind of (re) writing of the past which attests that the financial crisis had many causes and involved many guilty parties so that it would be unfair to scapegoat the banks alone. Thus David Cameron argues that there were 'numerous causes for the credit crunch beyond the folly of the banks', including failures by governments, regulators and politicians. It would therefore be wrong to indulge in banker-bashing when, 'there were a lot of people to blame for the mess we are in' (cited in Pickard & Jenkins, 2011). The revisionist political line is that the crisis was not about banking business models, but about debt for which we are all to blame. A recent Department for Business, Innovation and Skills (2010) document opened with the claim that, 'we can no longer have an unsustainable accumulation of private debt that inflated property bubbles and ultimately caused a banking crisis and sharp falls in output.'.

In this political extension of, or fusion with, the DCAF narrative it is as though household indebtedness caused the problems for banks, rather than bank lending practices causing household indebtedness and a real estate bubble. These assumptions and claims can hardly be taken seriously, but they provide the context in which the impetus to reform falters. Expectations about the scale and extent of banking reform have been lowered. 'Project Merlin', the voluntary deal between the leading banks and the Treasury, has been effectively reduced to modest requirements for greater transparency over pay with (voluntary) restraint on bonuses, plus some limited lending targets. The interim report of the Independent Commission on Banking promotes competition and stability by some ring fencing (without breaking up the banks or imposing full subsidiarisation. Meanwhile, the June 2010 Budget announced dramatic changes to corporate tax law which will work to the advantage of finance. Finance companies will pay no tax at all in this country on money made by their foreign branches, including those in tax havens; but banks will still be able to claim the expense of foreign branches against tax paid in the UK (Monbiot 2011).

2. Political arithmetic and interference: filling the gaps

Before we can turn to Haldane's achievement through political arithmetic, it is worth noting how the 'social value of finance' narrative articulated by the DCAF differs from the discourses or knowledges that are generally the object of much social studies of finance (SSF) literature. Predominantly SSF authors focus on the performative effects of formal and abstract knowledges on human calculation, action and the formation of market structures; principally the power of economic theory to reproduce the detail of social and economic reality in a form consistent with its assumptions (Callon 1998). Abstract economic theory therefore operates as both instruction manual in the construction of markets and behavioural code for market conduct, so that there is growing verisimilitude between textbook theory and economic

reality. Similar ideas are advanced by anthropologists like Danny Miller and xxx Carrier who use the concept of virtualism to emphasise the growing power of economic theory and its practical effects in shaping economic practice (Miller 2002; Carrier 1998).

Whilst we agree that there are many instances where formal, abstract thought has material effects (see, for example Froud et al 2006 and Engelen et al 2011), we would not wish to suggest that all narrative forms conform to this rule at all times. There are many other kinds of worldly discourses which work in other ways; and the finance sector's account narrative about the social value of finance and the need to 'move on' is a good example of something rather different. Bob Diamond''s discourse is less Callon and more Mandy Rice Davis because 'he would say that wouldn't he'. The differences are twofold:

- The social value of finance narrative is pragmatic and largely instrumentally motivated: it is about taking the line (whatever line) is most likely to elicit a favourable regulatory outcome from the crisis for the benefit of the financial community. The obvious point of reference here is not economic theory but other trade narratives, like that of big pharma (Froud et al. 2006), which work in a very different way. Their main aim is to create a political space for manoeuvre by (re)furbishing reputation which is typically done by prompts and suggestions about the social benefits of private activity. Like adverts, trade narratives do this by repeating simplifications and asserting connections which they hope to imprint in the minds of policy makers and the social psyche. Thus, a large and competitive finance sector is associated with Britain's economic recovery and future prosperity; just as, in the big pharma narrative, the high profits from patents are associated with research that saves lives.
- The DCAF narrative also reflects extant structures of power articulated by individuals who have a pecuniary and organisational interest in the status quo and the defence of their privilege. This is perhaps less the case with formal knowledges like economics which are often developed by well intentioned academics (even if they are harnessed by vultures). If we recall the early 1900s debate between Austro-Marxists and the Hegelians, we would echo the sentiments expressed then by authors like Adler: it is dangerous to assume that all ideas are somehow 'spiritual' in character, insofar as they are formed 'free from any earthly taint' (Adler 1978, p. 255). This point is an essential one to make when so much of recent social science output has written-out the mundane politics of private interest groups that lie behind dominant narratives.

The soundbite and factoid driven narrative has become much more important as the old style politics of class based mass parties has been supplanted by new style politics of identifications marketed through the mass media. The materiality of news and current affairs programme production complement the trade narrative form because time pressures and the general kineticism of media output favours the singular, simple and compact pre-packaged idea. This is enhanced by magazine and rolling news formats which either utilise vox-pop commentary or dedicated 3-5 minute segments to a clipped dialogical contest between respondents positioned 'for' or 'against' (Lewis, Cushion and Thomas 2005). Such formats work against considered analysis of complex issues and guarantee airtime for industry spokesmen. In consequence, a trade narrative about finance can spill out and overflow, taking on its own autonomy and momentum as it becomes classified as 'an agenda item' that demands coverage. This leads to its broader circulation and modification through a larger number of actors and outlets as efforts are made to find the facts that reference the agenda item. It transmits, as Dawkins might have it, as a 'meme', often within interdependent circuits of news and knowledge production motivated by 'a desire to make the world conform to the image' (Leyshon et al 2005).

Against this background, the use of simple counterfactual exhibits and sharp criticism are not only an effective response to the partial and exaggerated claims of finance, but they are an essential input to a broader debate about the shape and scale of banking reform going forward.

It is then all the more surprising that a small number of social constructionists misread and disparage revisionist political arithmetic as a kind of lower level activity for those engaged in the naïve pursuit of true or truer accounts - this is Christophers' (2010) position on our own Alternative Banking Report. This point completely misunderstands the practice of critical political arithmetic. The financial crisis incurred social costs which are variably calculated and well documented in government accounting sources, reports and so on. These costs are either ignored or downplayed in the trade narrative of finance that seeks to prevent radical reform. The use of counter exhibits and argument about costs is not here part of some positivist quest to establish pure truth, or some approximation of it. Rather the numbers on costs are part of discursive interference which works by unsettling established identifications. Trade narratives are especially vulnerable to such interference because they typically present simplifications with confirming examples or factoids used to construct what Althusser and Balibar (1970) described as a 'lacuna discourse', which works through rigid framing and leaves many gaps. The revisionist practice of drawing attention to these lacunae does require a political motive, but it is then compatible with many different epistemological positions of varying sophistication.

Whatever Haldane's position on epistemology, his practice of interference through revisionist political arithmetic is masterly. Haldane combines technical understanding of the statistical resources with commitment to imaginative concepts and innovative modes of measurement. All this is politically harnessed to maximise the interference by highlighting the costs of finance and the extractive role of the activity which thereby challenges the trade narrative framing about the benefits of finance and its social contribution. In a series of papers, Haldane has made a threefold contribution: first, by measuring the costs of finance which are defined as negative externalities of an industry whose revenues are boosted by 'risk illusion'; second by explaining why financial institutions tried to 'keep up with the Goldmans' and then passed costs onto the State; and, third by suggesting radical principles for re-regulation to escape the 'doom-loop' of moral hazard.

The contribution of finance can be diminished just as effectively by reducing the apparent benefits of finance as by adding hitherto neglected costs. So, Haldane is revisionist about the standard statistical accounts of what finance contributes to the UK and other high income economies. Here, Haldane (2010, p.3) argues that the significant growth of returns in financial services over the past few decades has more to do with 'risk illusion', rather than any kind of productivity miracle. Factor inputs of labour and capital have been static since the 1990s, but returns have increased dramatically so that financial services contribution to GDP has grown and total factor productivity has increased (albeit in short, sharp bursts). But Haldane argues that these figures are misleading because they fail to take account of increased risks in the form of leverage, trading book expansion and derivatives trading, which incur costs further down the line. He concludes that 'an industry which does not accurately assess and price risk is not adding much value to the economy'; hence financial services contribution to the economy is overstated because the apparent returns are not adequately risk adjusted.

After the crisis, undisclosed risk has become burdensome cost, so that finance has sizeable negative externalities: 'the banking industry is…a pollutant. Systemic risk is a noxious by-product' (Haldane 2010b, p. 2). The direct costs of the bailout measured as a transfer of wealth from the UK government to UK banks is relatively modest at £20bn, but (when the full indirect costs of output loss for the whole economy are accounted for) Haldane argues that the figure could rise to at least £1.8 trillion and possibly £7.4 trillion for the UK and between $60 trillion and $200 trillion for the world economy. If these costs were to be internalised by the industry, assuming that a crisis occurred every 20 years, it would require a systemic levy in excess of $1.5 trillion per year – more than the total market capitalisation of the largest global banks (Haldane 2010b, pp.3-4). The implication is that banking (as it currently exists) does not add but subtracts value from the surpluses generated in the UK and global economy over the long term. There is of course no one best way of measuring this

effect. Haldane (2010b, p.5) has qualified his 'worst-case' calculation with a more considered study which simply monetises the difference between the 'support' and 'standalone' credit ratings for the banks and then finds an average annual subsidy of £50 billion for the top five banks between 2007-9. His conclusion is that this demonstrates the 'real and on-going cost to the taxpayer and a real and on-going windfall for the banks'.

On Haldane's account, banking is a pathological activity which does not add value but passes cost and extracts social subsidy because banking strategies have adapted to an incentive structure which combines shareholder value pressures, limited liability structures and the presence of implicit state bailout guarantees (Alessandri & Haldane 2009, pp. 7-8). These incentives combine to encourage risky behaviour because the gains are privatised by senior investment bankers before losses are socialised at the tax payers expense. Thus, shareholder value pressures and internal incentives encouraged risk taking as banks desperately tried to 'keep up with the Goldman's' by ramping their risk profiles. This boosted profits and created a credit bubble in the upswing, but led to an economically debilitating credit crunch with huge social costs when the bubble burst (Aikman, Haldane & Nelson 2010, p.4). The costs of the crisis were astronomical and largely borne by the State: 'the scale of intervention to support the banks in the UK, US and the euro-area during the current crisis…totals over $14 trillion or almost a quarter of global GDP.' (Alessandri & Haldane 2009, p. 2). Haldane inverts the line of causality in the trade narrative which implies that the state increasingly depends on the finance sector for tax revenues and GDP growth; rather, he argues that the finance sector is increasingly dependent on the state for covering the downside risks and costs. Increased leverage or ever more complex derivatives are just, 'the latest incarnation of efforts by the banking system to boost shareholder returns and, whether by accident or design, game the state' (Alessandri & Haldane 2009).

From this point of view, the most important issue is not the form of re-regulation but the direction of travel which should be towards a smaller banking sector which will require less state bailouts when losses are incurred. While the trade narrative justifies the continued growth of the financial sector, Haldane's political arithmetic suggests the benefits of a smaller financial sector. (Haldane 2010b, p.10). On Haldane's calculation, in the space of a generation, the expansion of bank balance sheets have increased the insurable interests of the state tenfold, particularly given the secular decline in capital and liquidity ratios at banks over the past century in the UK and US. Haldane sees this as the logical consequence of what he terms a 'doom loop': any crisis that requires the state to bailout its financial sector will create moral hazard; market participants will double their bets post-bailout because they know all of the downside will be borne by the State. On a sombre note Haldane concludes that this doom loop now has serious macroeconomic consequences because the size of bank liabilities are such that many states can no longer guarantee financial sector losses in the future.

In a series of papers, Haldane has used political arithmetic and argument to interfere with the trade narrative about the social benefits of banking and developed his own alternative narrative about the social costs of banking. After Haldane has filled in the gaps, the political result is that the trade narrative of the bankers is implausible because it ignores the costs of banking; whether Haldane seeks or has delivered a precise, true or truer account of the costs and benefits is politically neither here nor there because what matters is its capacity to frustrate and block the instrumental industry-led narrative on reform.

3. Scientific control by changing the metaphor?

Haldane's more strategic criticism gains prestige from its social and intellectual association with natural science. Haldane originally brainstormed with Lord May the Oxford university zoologist who is former head of the Royal Society and ex-chief scientific adviser to the government, about what finance could learn from the life sciences. Later Haldane published

jointly in Nature with Lord Robert May (Haldane & May 2011). Intellectually, Haldane's gambit is to replace the old physics inspired economic models with a form of economic analysis that draws heavily on life sciences as the basis for a technocratic project of (re)mapping the economic world, so that it is rendered more amenable to control by central bankers and/or other regulators. So far what Haldane has done in a pre-paradigmatic way is propose new metaphors or visualisations of financial markets, while retaining very traditional ideas about science, the order of things and technocratic control. In our view, the project of re-imposing order is fraught with difficulty, while the metaphors from life sciences do not always translate into workable control technologies - partly because of the activity-specific characteristics of finance.

In 'Rethinking the Financial Network', Haldane (2009) sought to understand the financial crisis through the lens of epidemiology and ecology, as the behaviour of a complex, adaptive network. This re-conceptualisation is achieved through the mobilisation of metaphor and analogy: it rests on the idea that relations that hold in one domain, can be transposed to another in order to make sense of that other domain. As authors like Lakoff (1993) have argued, this involves a two-step process of first 'abstraction' as relationships are isolated and viewed independent of the objects to which they apply, and second 'transposition' as those abstract relations are then transferred to a new domain, identifying commonalities which aid understanding. Thus Haldane begins his 2009 paper by using SARS to illustrate network properties that were also present in the financial crisis that ensued after the collapse of Lehman Brothers:

> Both events were manifestations of the behaviour under stress of a complex, adaptive network. Complex because these networks were a cat's-cradle of interconnections, financial and non-financial. Adaptive because behaviour in these networks was driven by interactions between optimising, but confused, agents. (Haldane, 2009, p.2).

Within this frame, Haldane then mobilises different metaphors to describe the properties of the financial network with more precision. Tropical rainforests have the robust but fragile properties of financial networks; hide and flight dynamics are illustrated by comparing the different responses to SARS in the 2000s and the yellow fever outbreak in Memphis in 1878; whilst the collapse of fish stocks in species-poor eco-systems shows how the homogenisation of bank strategies can lead to similar failures in finance. Later work deploys analogies and metaphors including systems of watch making, the terrorist network of Al'Qaeda and the social network of Facebook (Haldane 2010b).

Haldane's change of metaphor is an imaginative response to crisis and illuminates new connections and processes that were hitherto unaccounted for. As Lakoff points out, metaphor is part of everyday communication; and it is hard to imagine how something as complex as financial markets could be rendered intelligible without some use of metaphor. But Haldane's metaphor-driven re-conceptualisation is allied to a project of (re)asserting technocratic control to promote a natural order of stability and resilience. The network concept leads to a proposal for mapping the financial network and vaccinating the interconnected nodes or 'superspreaders' through the introduction of Central Counterparties (CCPs) and derivatives netting (Haldane 2009, p. 25). This project of re-conceptualisation leading to new measurement and control fits with standard accounts of earlier economic policy revolutions. Keynes General Theory led to war time national income accounting and measurement of the inflationary gap; just as 1970s monetarism led to a proliferation of different measures of money stock. The ambition of Haldane's project should therefore be welcomed, but it is also important to remain sensitive to its potential weaknesses. We would highlight three such vulnerabilities. First, whilst metaphors are a good way of signalling broad similarities between the properties of one object and another to aid general understanding; there is greater potential for blur and confusion when metaphor-driven explanations are developed into the mathematised world of control technologies where the detail is paramount. Second, mapping

the financial network as a precursor to control raises questions about whether this opens out or closes down alternative understanding of order within, and the operations of, financial markets. This is all the more relevant for a third reason: that there are sector specific problems about mapping the financial network which arise from the interactivity between the subject-controller and the object controlled; or what is more commonly referred to as 'the observer effect'.

The search for isomporphism and the emphasis on relational similarities often leads to the neglect of subtle differences which complicate intervention and control initiatives. Consider, for example, the analogy between the 2007 financial crisis and SARS in Haldane's 2009 paper and his critique of 'hide' strategies which prevent contagion at high economic cost. On closer inspection, the analogy is blurred and the lesson for regulators is unclear.

For example, Haldane's use of the macro-metaphor of SARS in his 2009 paper contains some ambiguity: it is used to emphasise how 'hide' strategies prevent contagion by containing infection locally; but it is also used to show the enormous economic costs associated with 'hide' when fear transmits rapidly under conditions of uncertainty, causing loss of output. Transposing this to finance, there is first blur about what is a 'hide' response and what is a 'flight' response. Haldane argues, 'hide' responses took the form of liquidity hoarding as firms refused to lend to others they feared might hold toxic assets. 'Flight' is defined as the 'fleeing' from toxic assets by financial institutions. But in the context of crisis both were opposite sides of the same coin, – assets were fire sold to raise cash that the institutions needed to stay solvent or to meet cash calls. Second, with SARS it is not clear whether the fear and over-reaction helped prevent the spread of the epidemic by encouraging people to stay indoors, or whether it incurred unnecessary costs relative to the risks of pandemic infection. Transposed to finance, what is the lesson for regulators? How easy is it to distinguish the actual danger of contagion from the fear of contagion which has the potential to be self-fulfilling? The two may imply quite different forms of intervention, or they may imply identical responses if the fear of contagion is assuaged by actions which are seen to meet some imagined problem.

If these are important matters of detail, there is also the broader question about what concept of science to use and how to think about order and disorder in social systems. Here there is a general danger that the dominant concept of the network closes out different ways of seeing or representing finance. This may perhaps obstruct other, more effective, policy interventions which would be adapted to sector specific characteristics and aren't deduced from the properties of other networks.

The one metaphor viewpoint is challenged by other sciences which admit the possibility of multiple ways or methods of understanding an object; as in the Copenhagen interpretation within quantum physics, which argues that atoms can be understood as either waves or particles depending on the context of the experiment. If our variable understanding of an external world depends on measurement and observation (Rae 2004, p.50), financial markets could be thought of as networks or as circuits or as vortexes (in different contexts and for different purposes). Circuits can be visualised in a number of different ways using the imagery of hydraulics or electricity. Such metaphors would be a useful way of thinking through the ultimately disastrous practice through which banks retained or bought AAA rated MBSs and financed them through the repo markets, using the same securities as collateral (see Erturk et al forthcoming). Serres' (2000) concept of vortex might also prove useful in thinking through the object of intervention in financial markets as a whole. Asset price bubbles are built through a process of circulation which is, like Serres' spinning top, in movement which is both unstable and stable, lasting as long as circum-stances allow (Serres 2000, pp. 28-30). This analogy brings out the unexamined binarism which underpins Haldane's concept of networks which are either ordered or disordered and cannot be both ordered and disordered. The distinction between the turbulence of disorder and chaos and the

vortex of orderly movement is certainly relevant and may be crucial to many kinds of economic and finance policy.

The problems so far discussed are general ones which would apply to most projects for reforming our social world by importing one master metaphor from the natural sciences, But another series of problems arise because Haldane' chosen metaphor about networks encourages a project of mapping the network which does not engage with specific problems about mapping finance which are created by the improvisatory nature of financial innovation. At this point epistemological understandings and misunderstandings are important. Cartography viewed as a purely technical exercise within a realist frame assumes that the function of a map is to provide a faithful representation of an external reality (e.g. Crone 1953); and that that reality is independent of the map. Within this frame, progress involves the application of scientific knowledge and measurement technique to increase the precision of that representation. Much of this is carried into Haldane's project of mapping the financial sector in the belief that, with better data and models, interconnectivity and risk can be identified more accurately so that policy makers with maps can locate incipient problems and intervene to prevent future financial crisis. However this approach may ignore the constructive social characteristics of maps and cartography when the cartographer defines what is made visible so that there is a reflexive, interactive relation between cartographer and 'the mapped' which creates particular problems in finance.

Cartographers have always had the power to name, define, measure and hierarchise so as to make visible in two or three dimensions that were previously invisible. Map-making involves political choices about what to include, what to omit, what is to be simplified and how the visible is classified. For example, nationalism pervades many traditional world atlases, where colours, symbols and other images are used to shape audience perceptions of entities; as when the British Empire was coloured red on the map and accounted for one quarter of the world's land area (Black 1997). The cartographer's power to define is here caught in broader structures of power. The technocrat as map maker operates with preconceptions and within political limits especially where mapping requires resources and supporting institutions. So that before new mapping can begin, we would expect some kind of preliminary contest about what is to be mapped and how with sectional interests and their political allies fully engaged in this struggle. This is all the more salient with the growth of dark pool trading which anonymises trading participants and restricts information on prices. If we suppose the cartographer avoids external policing, there is still the problem that the finished map may give the false impression of 'mastery' – that the act of mapping makes the object appear controllable and that the technocrat with the map 'knows what he/she is doing. This illusion may be all the more convincing when 'the rules of society and the rules of measurement are mutually reinforcing in the same image' (Harley 1989).

These general problems about map making are complicated in the finance sector by an unacknowledged potential for interactivity between subject and object; between cartographer and 'the mapped'. In much physical geography this is not a problem because the topography of the equatorial rainforests would not alter because a cartographer maps them, just as the route of the M1 motorway between London and Leeds does not change if a cartographer represents major roads in a different way. However finance is different because there is a powerful 'observer effect': the presence of an observer changes the behaviour of the object that is mapped, because their relation is interactive and reflexive. The observer effect is well acknowledged in sociology and anthropology, where discussion has moved so that the ethnographer's interaction with the 'research participants' is now a central part of the story. In financial markets, the problem is that actors have an unusual ability to alter their behaviour in response to the imposition of new laws, regulations and control mechanisms. This is so because financial innovation takes the form of bricolage which builds structures from events (Levi-Strauss 1966), so that major regulatory change is not a constraint on innovation but an input for a new phase of innovation, as was the case with the Basel II regulations on capital

adequacy (Engelen et al 2010; Engelen et al 2011). Mapping the financial network in an attempt to identify and vaccinate the superspreaders would therefore probably encourage industry reorganisation to frustrate or game the controlling intervention. Once the financial market learns that regulators are using particular measures to assess risk based on a particular model of network, they will move to areas not visible on the map, or think of novel ways of making their activities unmappable.

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It is not possible to provide any definitive verdict on the papers published and positions taken so far by Andrew Haldane since the beginning of the financial crisis. This is work in progress because Haldane and the other dissident elite technocrats continue to publish in a changing conjuncture. Our interim verdict will be qualified by changing circumstance and more intellectual work inside and outside their circle. The history of ideas is (re)written by the winners so that positions which are an intellectual cul de sac in one conjuncture can be revalued by unanticipated events so that within a short period they are a fruitful beginning. Policy intellectuals, like Napoleon's generals need luck as much as judgement on the kamfplatz. But, when that has been said, as long as financial reform is blocked with stories told by the distributive coalition, Haldane's awkward and trouble making political arithmetic will probably be more salient to outcomes than the strategic criticism which has secured his reputation amongst academics.

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