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NEW MEASURES FOR THE NEW ECONOMY
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TABLE OF CONTENTS

NEW MEASURES FOR THE NEW ECONOMY ........................................................................................ 1  
PREFACE............................................................................................................................................. 3  
1. SUMMARY ...................................................................................................................................... 4  
2. THE KNOWLEDGE ECONOMY ...................................................................................................... 7  
3. THE PROBLEMS POSED BY INTANGIBLES ................................................................~~~~~~~~~~ 12  
4. THE COSTS OF INADEQUATE VALUATION OF INTANGIBLES ............................................. 17  
5. NEW MEASURES OF INTANGIBLES ............................................................................................... 21  
6. CONCLUSIONS: THE WAY FORWARD ........................................................................................ 41
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2. Charles was Labour Editor, Industrial Editor and Tokyo Bureau Chief at the *Financial Times* before becoming the paper’s features editor. He works from home, where he lives with his wife and three children.

3. Demos is an independent think-tank based in London, engaged in long-term thinking on policy issues ranging from welfare reform and the future of government to economic policy.
1. SUMMARY

4. A growing share of economic activity is intangible and immaterial. The service sector accounts for a growing share of output and employment in developed economies such as the United Kingdom and the United States, but also in rapidly developing economies such as Singapore. In the UK, on current trends, manufacturing and agriculture will account for perhaps only 15% of output and employment by the year 2005. Information technology has become pervasive, in production processes and in products, many of which have become more technologically complex. Within companies, in both the manufacturing and service sectors, intangible assets such as brands, intellectual property, know-how and copyrights have become more important. Less and less economic activity involves the manipulation of physical commodities; more and more economic activity involves processing and analysing information, making judgements, providing services and manipulating images. Science is breeding entirely new industries and families of products, such as biotechnology and nano-technology. Media and cultural industries, including entertainment, tourism, film, television and computer games, employ a growing share of the workforce. Two very powerful trends are combined in these developments.1

5. First a growing share of what we produce and consume is “immaterial”: information, judgement, analysis, service, entertainment, advice. The assets we use to produce these immaterial goods are increasingly immaterial as well. We increasingly rely on information technology, software, design and personal skills. Less and less of what we value as consumers or as investors can be stockpiled at ports, loaded onto railway wagons, stored in warehoused or weighed on scales.

6. Second, the generation, application, orchestration and exploitation of knowledge is becoming critical to how companies, regions and economies develop and sustain competitive advantage. The new economy, as it has come to be called, is not simply the product of technology and science. It is also a product of more open liberalised markets. Companies must base their competitiveness on assets which are distinctive, durable and which they can replicate and appropriate, but which their competitors find it hard to imitate. In an increasingly open world economy, in which intermediate input markets for components have proliferated, it is increasingly difficult for companies to sustain their competitiveness on the basis of traditional assets: land, raw materials, machinery and cheap labour. In an open economy most of these traditional physical assets are available on equal terms to a company’s competitors. Companies increasingly base their competitiveness on intangible assets, capabilities and competencies, which consumers value and which competitors find it hard to copy. The idea of the “knowledge-driven economy” is not just a description of high-tech industries. It describes a set of new sources of competitive advantage which can apply to all sectors, all companies and all regions, from agriculture and retailing to software and biotechnology.

7. One consequence of these two forces is that companies are increasingly difficult to value reliably and accurately. Stock market valuations of companies, especially high-tech and service companies, are frequently several times higher than their book values, which reflect the break-up value of their physical, tangible and financial assets. This gap between market and book values – known as Tobin’s Q – is taken

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1 This account of the rise of the knowledge economy is set out in more detail in Charles Leadbeater, “Living on Thin Air.” Viking/Penguin 1999.
by many as evidence that intellectual capital, broadly defined, is increasingly important to corporate wealth. This gap is also the starting point for many criticisms of traditional financial accounting, which finds it difficult to reliably value the intangible assets that seem to matter most in a modern business.

8. This paper explores how policy-makers, accountants, managers and investors could respond to the uncertainty over how intangibles should be valued. The analysis proceeds through these stages:

i) In section two we examine briefly the evidence that economic activity is becoming increasingly “de-materialised” and the related claim that economic growth and productivity improvements are increasingly “knowledge-driven”.

ii) The paper then examines the nature of the problems which intangibles create for accounting and modern approaches to valuation. This section argues that the nature of intangibles assets – particularly their lack of contractability and tradability – makes them difficult to price and so difficult to value. The system of accounting for intangible assets will only be improved, the paper argues, if this underlying economic problem is addressed: better accounting measures of intangible assets will only develop in parallel with better functioning markets to trade these assets.

iii) The paper goes on to examine evidence that the gap between the market valuation of intangibles and the accounting valuation creates social harms or economic inefficiencies that need correcting. This includes evidence that inadequate valuations of intangible assets may provide scope for insider dealing, lead capital to be misallocated, raise the cost of capital for knowledge intensive companies or promote volatility.

iv) The report’s fifth section examines the different responses which could provide more reliable measures of the value of intangible assets. This section argues that accounting based approaches, whether these build on traditional approaches or put new intellectual capital measures in their place, will only be part of the solution. Improving the market valuations of intangibles by creating better functioning markets for intellectual capital will also be critical. Better and more reliable accounting measures may only develop only on the back of these new markets for intangible assets. Although new measures of intellectual capital seem attractive, many have significant drawbacks: for instance, some could be cumbersome inventories that could allow managers to manipulate perceptions of intangible values to the detriment of investors. Too few of these new measures are focused on how companies create value and make money. These new approaches may fare no better than traditional accounts in dealin with volatility, uncertainty and change.

v) The paper’s final section considers the way ahead, to provide more accurate, published measures of the value of intangible assets. The paper’s conclusions can be summed up as follows:

a) Accounting valuations of intangible assets will only become more reliable in tandem with the creation of more efficient and reliable markets to value intangible assets.

b) Putting a reliable valuation on intangibles is not just an “accounting” problem, to be solved by accountants. The problem is more fundamentally an economic issue of how to price intangibles in the absence of properly functioning markets.

c) As a consequence we will only arrive at more reliable valuations for intangibles through a multi-disciplinary approach which engages economists, accountants, intellectual property specialists and employment contract specialists, for example. The problems involved in
accurately valuing intangibles cannot be resolved within a single academic or professional discipline.

d) Legal and institutional reforms need to embrace not just accounting standards, but the operation of markets for capital, labour and intellectual property as well. Accounting reforms and market reforms need to go hand in hand.

e) Although reform is badly needed, to provide more reliable measures of intangibles, it is best done incrementally. The worst approach would be to ignore the growing problem of valuing intangibles. But it would be almost as bad to attempt to devise a new grand design or a global set of standards for measuring intellectual capital. Such a grand design would almost certainly prove to be too cumbersome and inflexible. Instead policy makers need to promote a cumulative and evolutionary process of innovation, learning and experimentation among accountants, investors, managers and capital markets, to develop new measures of the value of intangibles.

f) The valuation investors place upon a company will increasingly be the product of multiple, overlapping and revisable sources of financial and non-financial information. Traditional accounts will be just one among many sources of information. Financial accounts may increasingly provide a “valuation of last resort”, for instance by providing investors with assurance that a company is financially sound. But it may be asking too much for independent accountants to provide a complete valuation of a company’s intangible assets. Corporate valuation may become less like solving a mathematical equation and more like solving a jigsaw puzzle or a cross-word puzzle. Traditional financial accounts will be just one, albeit a critical, component in solving this cross-word puzzle.

g) As corporate valuations are likely to be the product of a plurality of sources of information and perspectives, accountants are likely to find themselves competing with other intermediaries and third-parties to provide reliable, relevant and valuable information which will help investors to value a company.
2. THE KNOWLEDGE ECONOMY

9. Two trends are combined in the rise of what has come to be known as the “new economy”. First, the goods and services we produce and consume are increasingly immaterial. They weigh less and less. Second, this has been made possible because the goods and services we consume have become much more technologically sophisticated and knowledge intensive. For both technological and competitive reasons, knowledge is becoming the critical distinctive factor of production in the new economy. These trends are not confined to so called high-tech industries, but are evident in the knowledge intensive sectors of all industries from retailing and agriculture to software and computing.2

10. When I was young I was very impressed when my Father crushed a Coca-Cola can. In those days Coke cans had to be opened with a can opener. Crushing one was a feat of strength. These days an empty can of Coke can be crushed in an instant. Cans are made from paper-thin metal. The Coke can’s dramatic weight loss has been made possible by technologists and manufacturers working out smarter and smarter ways to make cans. Modern drink cans are 80% lighter than when I was a child. Put it another way: the modern Coke can is 80% technology and 20% metal.

11. Take another example: the corn that grows in the fields of East Anglia. Modern corn is vastly more productive that it was 50 years ago because farmers and plant breeders have developed hybrid seeds more resistant to frost and disease. On some estimates the average acre of corn now produces 80% more usable crop than it did 50 years ago. Modern corn is 80% science, 20% corn.

12. The lap-top computer I am using to write this report is roughly the same weight as the machine which I bought seven years ago. Both machines have the same ingredients - plastic, copper, gold, silicon and a variety of other metals. Yet the new machine is ten times more powerful, far faster and more adaptable, than the old machine. None of this extra power is due to new materials. The difference is entirely attributable to how the same physical ingredients have been minutely rearranged to make them vastly more powerful. The silicon in a semi-conductor is virtually worthless; what makes it valuable is the logic inscribed on its surface. The value comes from the human intelligence embedded in the product. Economic growth is driven by the creation of better and better recipes to combine our available resources in more and more efficient, innovative ways. That is why the generation, application and exploitation of knowledge is the driving force of modern economic growth.

13. The knowledge driven economy is not just a new set of high-tech industries such as software and biotechnology, which have built on a science base. Nor is it just a set of new technologies: information technology and the Internet, for example. The knowledge driven economy is about a set of new sources of competitive advantage, particularly the ability to innovate, create new products and exploit new markets, which apply to all industries, high-tech and low-tech, manufacturing and services, retailing and agriculture. In all industries the key to competitiveness increasingly turns on how people combine, marshal and commercialise their know-how. That know-how can come from many sources, from shop-floor

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2 This analysis was set out in the British government White Paper “Our Competitive Future: Building the Knowledge Driven Economy” published in December 1998.
improvements to quality and productivity, sale sales staff ideas to serve customers better, as well as from “knowledge workers” designers, technologists and scientist.

14. There is nothing new in the idea that knowledge is a driving force for economic growth. But several factors are combining to make it critical to competitiveness in modern economies.

2.1 Knowledge Push

15. One is the spectacular growth of organised science, the consequent acceleration of technological change and the speed at which new ideas are translated into commercial products, in travel, communications, medicine, pharmaceuticals, robotics, information processing and genetic engineering, to take just a few examples. There are more scientists at work today than in the rest of human history combined. We are doing more science, more productively and translating the products more quickly into commercial applications. We invest far more than previous generations in education. It is easy to forget just how recent and incomplete this investment has been. In the UK a national system of secondary education was only created after the Second World War. Higher education spread to involve more than 10% of 18-year olds in the UK only in the 1980s. In the late 1990s, about 35% of 18 year olds were studying for university degrees. The demand for and the supply of education will increase rapidly in the next few years, partly through government policies but also through the spread of technologies that will make learning easier.

16. Our ability to share this “explosion” of formal, explicit knowledge has been dramatically enhanced by the spread of new ways to collect, analyse, store, retrieve and communicate information. Twenty-five years ago a megabyte of computer memory cost about $550,000; today the price is $4. It took 30 years for radio to reach an audience of 50m in the U.S. The Internet passed than threshold in less than half the time. In 1997 there were about 200m computers in the world. By the year 2001 there will be 500m. Far more important will be the computers and microprocessors that will become embedded in our everyday life, sitting on top of our televisions, inside our cookers, controlling our heating systems, threaded through our clothes. In 1997 there were about 6bn semi-conductors at work around the world. By the year 2001 there will be 10bn.

17. More information is not better information. Our capacity to generate information far outstrips our ability to use it effectively. When information is cheap and plentiful what matters is the capacity to make sense of it quickly, turning it into understanding, insight, judgement and action. To compete companies need to call upon know-how which is distinctive to them; not information which is available to all.

18. It is easy and mistaken to see the new economy as just the consequence of this investment in intangible assets and intellectual capital – science, educated workers, information technology. This leads to an assumption that if we could measure the scale of the stocks and flows of these new intellectual assets we could pin down the value of the intellectual capital deployed in the new economy. This is mistaken. Intangible assets gain their value when they are deployed in competition to serve consumers. Their value is highly context dependent. A powerful set of competitive pressures, are pulling companies towards know-how as a source of competitive advantage which competitors find it hard to imitate.

2.2 Market Pull

19. In increasingly open global markets products can be made anywhere and shipped to any market; financial capital is less scarce and production technologies can soon be copied by developing nations with increasingly well-educated workforces. In this context developed economies cannot base their future prosperity solely on the traditional assets of the industrial economy: raw materials, land, machinery,
labour. All these assets are available to on equal if not better terms to emerging competitors. Developed economies must base their competitiveness on distinctive assets, which their competitors find it hard to imitate and which we can generate high-value added products which consumers values. The assets which play this role are our know-how, skills, creativity and talent.

20. This trend is affecting all industries, not just the high-tech leading edge. Retail bankers used to measure their market share in the UK by the total mileage of their counters stretched out along the British high-street. The longer the counters, the more customers that could be served and so the larger the bank’s market share. The days when physical assets were the key to competitiveness in retail banking have gone. In 1998 the fastest growing bank in the UK was Egg, run by an insurance company, the Prudential. Egg has no high-street presence and will do all its business over the Internet, and by using digital television and the telephone. Standard Life Bank, the UK bank created by a mutual assurance company, was selling a mortgage a minute in the first three months of 1999; one of its telephone sales-staff was doing the same volume of business as 11 high-street building society branches.

21. Globalisation, deregulation and liberalisation is driving companies to base their competitive advantage on brands and other intangible assets such as know-how, which cannot be easily imitated or traded. Since the 1960s international trade has been liberalised, import restrictions have been removed and tariffs reduced. As a consequence the manufacturer of a basic product - a bag, a stereo, a laptop computer - can make that product virtually anywhere and ship it to any market in the world, without facing significant tariff barriers or other restrictions. As a result manufacturers have a strong incentive to invest in low cost production sites as long as they deliver acceptable levels of quality. In a world where products are getting lighter and less energy intensive access to raw materials and transportation costs are less important than they were. The spread of information technology and the rise in educational standards means production technologies can quickly migrate from developed to developing economies. In contrast, a strong brand, for example, is difficult to copy because it is so value laden. Tacit knowledge, often held in the heads of employees or embedded in corporate routines, is similarly hard for competitors to mimic.

22. David J Teece, Professor of Business at the University of California at Berkeley, explains why intensified competition in liberalised markets has made intangible assets so valuable:

“The decreased cost of information, the increase and spread in the number and range of markets in which companies can buy production inputs, the liberalisation of product and labour markets and the deregulation of financial flows, is stripping away traditional sources of competitive differentiation and exposing a new fundamental core to wealth creation. That fundamental core is the development and astute deployment of intangible assets, of which knowledge, competence and intellectual property are the most significant. Other intangibles such as brands, reputation and customer relationships are also vital. Special access to natural resources and skilled labour, economies of scale and scope, are fading as sustainable bases for competitive advantage. In the end, wealth creation in a world of heightened competition comes down to developing, orchestrating and owning intangible assets which your competitors will find it hard to imitate but which your customers value.”

23. Market liberalisation is just one factor that has made intangible assets more critical. Another is the rising importance of intermediate input markets, which increasingly organise production of components in many industries that were once vertically organised by large companies. It is increasingly common for assemblers of products, such as personal computers, to buy many of their components through networks of sub-contractors or on open markets. This spread of markets for intermediate inputs means a company will increasingly face competitors who can procure similar inputs from sub-contractors. That makes it harder

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for a company to base its distinctive competitive advantage on the quality of these inputs. Instead the company has to control and appropriate assets which cannot be bought from a supplier: the company’s own capabilities.

2.3 What knowledge based competition means for companies

24. Companies increasingly need strong, distinctive internal capabilities. However a company’s distinctive know-how has to be combined with complementary assets, resources and skills provided by partners, investors and suppliers. A bright idea for a new product has to attract finance to research and develop it; it will require skills and investment to make it and different capabilities to market it effectively. Intellectual capital on its own is never enough. The job of senior management is increasingly to orchestrate this dynamic combination of complementary skills and assets to generate and then realise innovative ideas and product improvements.

25. Know-how is increasingly important to how companies compete across all sectors of the economy. Yet know-how will matter for different reasons, depending on the competitive conditions that companies face, the kind of know-how they need and where it comes from. There is no “one-size-fits-all” solution.

26. In traditional industries and services, for example high-volume process industries, such as oil and chemicals, or low value-added services, such as fast food and retailing, companies need to marshal the know-how of their staff, suppliers and customers in a continuous effort to improve quality and productivity. Many large companies have begun to recognise this, partly through quality and continuous improvement programmes and more recently through knowledge management initiatives, designed to disseminate best practice or to create corporate learning programmes. These companies need incremental improvements to be efficient, flexible and high-quality. Most of the know-how they need may already be in the heads of their suppliers, staff and customers.

27. Even traditional, relatively slow moving industries can be subject to sudden and disruptive competition brought on by new technology: for example the upheaval in retail banking in the UK brought on by the emergence of new competitors with telephone and Internet banking. This kind of competition may soon affect other industries as traditional intermediaries who have sold products to consumers – insurance brokers for example – find themselves competing with new entrants who go direct to the consumer using the telephone and the interactive television. Companies in traditional industries have to be able to combine continuous improvement with a capacity to reinvent and renew themselves in the face of new competitors.

28. Knowledge plays a critical role in a range of industries, such as pharmaceuticals and aerospace, which have traditionally invested heavily in research and development. These are capital intensive industries in which companies often need scale and financial resources to generate (through research and development) and exploit (through global distribution and marketing) their know-how. The know-how in these industries is heavily regulated by outside bodies for safety reasons. Ideas are often patented. In contrast, in equally high-tech and knowledge intensive industries such as software and electronics patenting is less common.

29. Know-how is critically important but in a quite different way in high-value added services, such as accountancy, business consulting, law, design, architecture and financial services, in which firms trade on the training, insight and judgement of their staff. In these professions human capital is closely regulated by qualifications. Creative industries, such as music, entertainment and fashion, are also people driven, but their creativity usually comes from a pool independent content producers. Britain, for example, has one of
the largest computer games software industries in the world, largely organised around young, self-employed producers, who sell their products to global companies such as Sony and Nintendo. In this global industry there are no qualifications and few training programmes. Both law and computer games companies dependent heavily on human capital, but in quite different ways; a qualification based measure of the quality of human capital that would be appropriate for a law firm would be next to useless for a computer games company.

2.4 Implications for valuing intangibles and knowledge

Intangible assets and capabilities have become more important as technological change has accelerated and markets have liberalised, opening up incumbents to new competitors. It makes sense for managers, investors, knowledge-holders and knowledge-workers to attempt value more accurately their know-how and other intangible assets. However the preceding account of why intangible assets have become more critical also highlights some reasons why these assets are so difficult to value:

i) The kind of know-how that companies need depends very heavily on the kind of competitive pressures they face. There is no “one-size-fits-all” approach. The kind of knowledge that is needed by a hotel chain or an airline, is quite different from that required by an advertising company or a biotechnology start-up. The value of intangible assets, knowledge and information is highly context dependent.

ii) Knowledge assets that are valuable in one setting may lose that value in another setting. The Coke brand may be very valuable on fizzy drinks but not so valuable on cars. Financial information may be highly valuable to market traders before it is released but virtually worthless a few minutes after its publication. Attaching a durable value to a piece of information, a brand or a competence, is thus very hard, especially in fast moving markets driven by fashion, branding or rapid technological change.

iii) A good deal of what makes know-how so valuable is that it is hard for competitors to imitate, in part because know-how usually combines some unspoken, routine or tacit ingredient. Even if formal intellectual property can be valued – patents and copyrights for example – valuing the associated tacit knowledge is very hard. Often explicit know-how – in a manual, a recipe or a patent - is of little value without the tacit knowledge and judgement required to realise it in practice.

iv) Often this tacit knowledge is embedded in corporate routines which are constantly evolving. Viewing know-how as an “asset” may be too static an approach. The intangibles which give companies a source of competitive advantage are better thought of as routine or capabilities rather than assets or capital, in some fixed sense.

v) Often the know-how of a single organisation only becomes valuable when it is combined with the know-how of partners and suppliers, manufacturers and distributors. The value of new treatments for diseases developed by biotechnology companies depends on the core intellectual capital but also on the soundness of the commercial strategy to exploit the know-how. Valuing the know-how separately from the commercial strategy to exploit it would be a partial account.

vi) In sum, intangible assets have become so much more important as a source of competitive advantage precisely because it is so difficult to pin them down, break them up, parcel them out and for competitors to imitate them. But that is also why it is so difficult for investors, accountants, managers and knowledge-holders to value intangibles.
3. THE PROBLEMS POSED BY INTANGIBLES

31. The rise in intangibles poses three different challenges for those attempting to value them. The first challenge appears to be the scale of the role that intangibles play within the modern economy. Intangibles now loom so large they demand to be measured more accurately. A second challenge is that the rising importance of intangibles is associated with a far faster rate of change in business performance with more innovation in products and processes driving greater volatility in corporate finances. The problem is not intangibles per se but the rate of change in business performance that investment in intangibles can produce. Any new approach needs to be well equipped to deal with this volatility and uncertainty. A third challenge stresses the nature of intangibles. In particular it is difficult to write watertight contracts covering intangibles and as a result it is harder to trade intangibles and intellectual capital in open markets than tangible assets. As a result it is hard to set a market-clearing, going-rate for these assets. The problem of valuing intangibles may show up as a weakness in traditional accounting, but it is not simply an accounting problem. Intangibles are difficult for accountants to value. But that is a symptom of a more fundamental issue: how difficult it is to trade and so price intangibles.

32. The accounting system is primarily based on the recording and reporting of discrete, transaction-based events, such as sales, purchases, investments, cash receipts and disbursements. In contrast change in business performance is rarely triggered by specific transactions and is often continuous rather than discrete. These changes may affect the value of an enterprise long before their impact on revenues and costs recorded by accountants becomes apparent.4 When rapid and significant changes in business performance are driven by investment in intangibles the difficulties of accounting for change are compounded.

3.1 Problem One: The scale of intangibles

33. One measure of the growing scale of intangible assets is the gap between the value of a company’s tangible assets recorded on its balance sheet and its stock market-value. This ratio, known as the “market-to-book-ratio”, has grown especially large for service and high-technology companies. In May 1997, for example, the market to book ratio for General Motors was 1.6, compared with 13.4 for Microsoft. An analysis in Business Week in July 1997 noted that Microsoft’s stock market value of $1488.5bn was worth the same as the combined value of Boeing $37.9bn, McDonald’s $34.7bn, Texaco $28.7bn, Time Warner $26bn and Anheuser-Busch $21.2bn. Only about 7% of Microsoft’s stock market value at that time was accounted for by traditional, tangible assets - land, buildings, machinery, equipment - recorded on its balance sheet. The missing 93% of the company’s value was due to intangible assets: brands, research and development and people. This trend is not confined to high-tech companies.

34. In 1997 a working group organised by the Centre for European Policy Studies examined the market to book ratios for thousands of companies in Europe and the US between 1990 and 1995. They found that the “market-to-book-ratios” of European companies rose from an average of 149% in 1990 to

202% in 1995. Over the same period, the US ratio went from 194% to 296%.\textsuperscript{5} One US study of more than 2,000 US manufacturing firms found that tangible assets accounted for just a third of their stock market value in 1994. A decade earlier book assets accounted for close to two-thirds of the value. Professor Baruch Lev, from the Stern School of Business at New York University estimates that US industrial companies now invest as much in intangible assets such as R & D and training as they do in physical plant and equipment.\textsuperscript{6}

35. This gap between market and book values shows up in mergers and acquisitions. When IBM bought Lotus, maker the Lotus Notes programmes in 1995, it paid $3.2bn. Of that $1.84bn went on research and development in progress: that is on intangible assets, ideas and people.\textsuperscript{7} A recent study of 400 US acquisitions between 1981 and 1993, with a median value of $2bn, showed that the mean of the price of acquisition to book value was 4.4. Acquisitions of high-tech companies in that period were based on market-to-book values of more than ten.\textsuperscript{8}

36. Although business surveys in the UK suggest that managers believe intangibles are increasingly critical to their company’s performance, these assets are rarely recorded on balance sheets or measured in annual reports. The Accounting Standards Board in the UK quoted at 1991-92 survey which showed that 81% of large companies reported no intangible assets in their balance sheets. A more recent survey found that 76% of 226 quoted companies did not record any intangibles on their balance sheet.\textsuperscript{9}

37. This suggests that market to book ratios may have risen in part because book valuations have been slow to adapt to the changing asset base of modern businesses.

3.2 Problem Two: The rate of change driven by intangibles

38. Accounting systems are slow moving and historic. They are not good at dealing with volatility, uncertainty and change. Yet increased investment in hard to value intangible assets produce just that. The problem is not just that intangible assets are hard to value; the problem is the rapid rate of change they produce.

39. In their extensive study of the financial accounts and stock market values of between 3,700 and 6,800 US companies, between 1978 and 1996, Baruch Lev and Paul Zarowin found that traditional financial information – earnings, cash-flows, book-values – had become less relevant to stock market valuations of these companies. In the 1960s and 1970s, changes in corporate earnings accounted for about 25% of the changes in stock market valuations. By the mid 1990s it was less than 10%. Lev and Zarowin found cash-flows and book values had become similarly less relevant.

40. Lev and Zarowin argue that traditional financial information has become less relevant largely because the rate of change in business performance has accelerated so markedly in the last 20 years. They organised the companies in their panel into ten groups on the basis of their market and book values. The top group was made up of the 10 per cent of firms with the highest values; the lowest group was the 10 per cent with the lowest values. Lev and Zarowin then measured how frequently companies changed their

\textsuperscript{6} PD Leek Lectures, Oxford, April 1998.
\textsuperscript{7} Flash The Flush
\textsuperscript{8} Quoted in presentation by Professor Keith Bradley, Open University Business School, Foundation for Performance Measurement London 1997.
\textsuperscript{9} Quoted in David Skryme: Measuring the Value of Knowledge, Business Intelligence, London, 1999.
position in the rankings by moving between groups. They found that change had become more common and more significant. In the 1960’s the likelihood of a company changing its position in the rankings based on its market value was between 30 - 40%; by the 1990s that had risen to 50% - 60%.

41. Lev and Zarowin’s argue this accelerating change spreads uncertainty and makes it increasingly difficult for accountants to match a company’s investments and expenses in one period, with its earnings and income in another period. Earnings in one accounting period are increasingly a poor guide to earnings in a subsequent period. This faster rate of change is in part due to deregulation and technological change, which has exposed companies to new competition and opened up new markets which are difficult to value. However investment in intangibles – research and development to create new products for example - also plays a significant role in driving change.

42. This US research found that traditional financial accounting performed reasonably well as a guide to market values when a company’s investment in intangibles was high and stable. Traditional accounting does not perform well when companies increase their investment in innovation for example to open up a new market. It is hard for investors and accountants to value this additional investment, particularly because the future earnings it might generate are so uncertain.

43. Lev and Zarowin’s suggest the problem is not the level of investment in intangibles but the rate of change. Changes to investment in intangibles are difficult to track. Those investments can lead to marked and unpredictable changes in business performance. Traditional accounting measures have been undermined by this faster, more unpredictable rate of change because accountants find it increasingly difficult to match costs and investments in one period to earnings and revenues in another.

44. This analysis suggests these conclusions:

i) Traditional financial accounting may perform reasonably well as a guide to stock market value – at least not markedly worse than it did in the 1960s – in mature industries, with a relatively slow rate of innovation and change, regardless of whether these industries depend heavily on intangibles or tangibles. The need for new measures may be less pressing in these industries, at least as far as investors are concerned.

ii) Traditional accounting finds it particularly difficult to cope with fast moving industries, with rapid innovation, driven on by investment in intangibles. New measures may be needed in these industries, but they need to cope with rapid change. Some of the proposed new measures of intellectual capital seem just as cumbersome as traditional accounting.

iii) Financial accounting is undermined by rapid change because it finds it so difficult to match costs and revenues. This suggests that financial accounts could be made more relevant by changes to accounting periods, to move towards more continuous accounting. Corporate reporting would become less a punctuated set of announcements, more a seamless flow of financial and non-financial information.

iv) A second possibility, canvassed by Lev and Zarowin, would be for companies to issue a rolling set of revisable five-year accounts which could provide a more accurate picture of a company’s track record. A company could initially account for a risky investment in new product development as a cost during its start-up phase. However if the product proved to be successful this expenditure could be restated in the past accounts as a capital investment. This would provide investors with different ways of reading a company’s financial history, which might inform their assessment of its prospects.
v) A third change would be to create “safe-havens” in accounts, in which companies could account for spending on future products and intangible capabilities as investments rather than as costs. This would allow companies to capitalise valuations of brands or research in progress, without those valuations migrating onto the formal balance sheet.

### 3.3 Problem Three: markets for intangibles

45. Accounting is at its best when accountants can record observable transactions. Knowledge assets and other intangibles, however, are difficult to trade and as a result it is difficult to establish a reliable market price for them. One way to establish more reliable accounting measures of the value of intangibles is to create more efficient markets for trading these assets. More reliable accounting values would emerge as a derivative of more reliable market values.

46. The market for know-how presents special challenges, as does the market for pollution rights, sports stars or works of art. These challenges complicate exchange of know-how to such an extent that the market for trading intangibles remains under-developed.

47. Markets work well when: there are large numbers of informed buyers and sellers aware of opportunities to trade; the objective performance properties and subjective utility of products can be readily ascertained and contracts can be written, executed and enforced at relatively low cost. Thus the market for standardised commodities such as wheat, coal, stocks, bonds and cars work well because these properties are largely satisfied. However markets for know-how and intellectual property lack many of these characteristics.

   i) Buyers and sellers may find it hard to find out about opportunities for trade, in part because companies often like to keep their know-how secret.

   ii) It is often dangerous for the sellers of know-how to fully disclose the details of what they are selling because once the information is released it cannot easily be “recalled”. Buyers, however, may be unwilling to buy without such disclosure. Trade in know-how requires levels of trust not required for transactions involving standard commodities. It is easy for both sides of the transaction to fear they will be ripped-off. As a result transaction costs for know-how are often higher than for standard commodities.

   iii) Buyers of intangibles frequently want customised services – for example legal and accounting services – which may have a limited or even a personalised market. The highly variegated nature of know-how means that markets to trade it are often thin and competition is imperfect. As a result establishing a fair, market-clearing price is more difficult than in heavily populated, “thick” markets.

   iv) The item of sale in an exchange is often not the know-how, but a bundle of rights to use the know-how. Rights are frequently bought and sold: rights to use radio spectrum, pollution rights, airspace rights, mineral rights, publishing rights, broadcasting rights. But rights are not like a physical commodity. Owners need special policing powers to enforce their rights.

   v) The unit of consumption is often unclear. When rights to use are sold, with ownership remaining in the hands of the originator, this kind of sale requires a metering arrangement for

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the originator to be paid each time the piece of know-how is used. These royalty agreements are rarely straightforward to enforce, especially in a world of global communications and digital reproduction.

48. These inherent difficulties in trading know-how vary according to the type of intellectual property at issue and the industry. The market for know-how generally works better in chemicals and pharmaceuticals where patents are ubiquitous and work well, than in software, where patent protection is uncommon and source code can be converted relatively easily. New drugs usually stand-alone and do not require complementary products to make them effective. Software on the other hand is only valuable when it is combined with other products, such as computers and printers. Know-how becomes more difficult to value the more tacit and organisationally embedded it becomes. Corporate competences are clusters of know-how assets, including discrete business processes such as order entry, quality control, product design, but also generalised organisational skills, such as “miniaturisation” and “tight tolerance engineering”. Competences are typically embedded in corporate routines that do not rely on a single individual and they cannot be bought and sold other than through a transaction for the entire business.

49. This analysis suggests the following conclusions:

i) Accountants would be in a much better position to value intangibles if there were more robust, open markets to trade these assets.

ii) Reliable valuation methods for intellectual capital may develop more rapidly in industries which enjoy strong intellectual property protection and where patenting is common, such as chemical and pharmaceuticals. These measures may be more problematic in industries where intellectual capital protection is weaker and less common.

iii) One avenue for policy-makers to explore would be the creation of new markets for know-how. One might be a financial options market to trade in futures linked to intangibles: an intangibles options market. Another development might be the creation of insurance markets in which companies could insure themselves against the loss of talent. Sports teams in the US and Canada already use this kind of insurance. There is evidence that a market for research and development is already emerging: R & D already accounts for a high share of the purchase price of high-technology companies in acquisitions.

iv) The development of open markets to trade intangibles would help accountants value these assets, but these changes would rely on policy-makers, regulators and capital market participants to agree institutional and legal changes to create these new markets. This would require a multi-disciplinary approach.

v) New markets to trade intangibles would still not involve the intellectual capital which companies most value, in particular their competences, capabilities, routines and tacit know-how. The market-valuation route for intangibles is far from a complete solution.
4. THE COSTS OF INADEQUATE VALUATION OF INTANGIBLES

50. There is a growing consensus that purely financial measures do not paint a complete picture of the strengths and weaknesses of a business. Yet for all their alleged weaknesses, financial measures, are still the most widely used, both inside and outside companies. There are good reasons for this: rules for public disclosure to investors put an emphasis on financial measures; financial information is easily comparable; companies are wary of disclosing more information because they worry about giving away a competitive advantage.

51. The starting point for developing new measures for intangibles is to understand the drawbacks of over-reliance upon purely financial measures. A more comprehensive approach which would help to value intangibles but also eliminate these drawbacks.

i) Competitive advantage stems from a wide variety of factors including human resources, financial strength, access to technology and brand reputation. Any measurement system which focuses on a single sort of measure will be partial. It would be like trying to fly a plane just using the altimeter as a guide, when speed, fuel consumption and angle of flight also need to be considered.11

ii) Published financial information is often historic: it reveals what has happened. Public financial measures often shed little light on the strengths and weaknesses that shape a company’s prospects. Using financial measures alone is like driving a car by looking in the rear view mirror.

iii) Financial measures are often only a snapshot: they do not account for the dynamics and processes at work inside a business over time. A measure of a car’s speed merely tells you how fast it is going over a given distance and period. A systematic account of the power of the engine driving the car provides a far more revealing picture of the performance the car is capable of. Executives, investors and auditors would benefit from a measurement system which looked inside the engine of a company.

iv) Companies are increasingly dependent upon networks of relationships with other companies - product development partners, suppliers, distributors, franchisers. The quality of these relationships with related companies are often vital to a company’s competitive position. Yet the value of these relationships is excluded from an assessment of the company’s worth unless there is a financial or equity based relationship. Relationships such as these are one aspect of organisational capital: it is vital to competitive advantage and needs to be accommodated within a new measurement system.

52. These criticisms of traditional financial accounting are familiar. However that does not show that the gap between stock market values and accounting values for companies creates real costs, social harm or

inefficiencies of a magnitude which policy-makers should address. In other words: who suffers because financial accounting is so poor at valuing intangibles?

53. The inadequacy of the current approach generates five main costs.

One: the risk of insider trading.

54. Insiders within a company or close to it are in a far better position to assess the strength of intangible assets and capabilities, than outsiders who lack specialist knowledge. In a biotechnology company, with several drugs under development it is far easier for the executives to assess whether trials will be successful than outside investors who may be ignorant of the science involved. As a result the insiders may be able to trade on this information which is not available to outsiders. This kind of information asymmetry is harder to sustain in companies such as oil companies which depend more on tangible, observable assets. The more a company comes to rely on esoteric know-how for its competitiveness, the more difficult it becomes for the average outside investor to assess the true value of this knowledge and the larger the gains to be made by insiders.

55. One US study 12 based on about 62,000 trades, in almost 3,000 firms between 1991 and 1995 found that insider traders made markedly higher gains the more heavily dependent their company was on intangible investments. The study found that executives from high R & D companies who traded in options and shares made an annualised return of 12.56%, over the period compared with an annualised gain of 4.4% for insiders in firms with no R & D. On some measures insiders in the firms with the highest R&D made gains of more than 20% on their trades.

56. Corporate financial reports are the main means of reducing information asymmetries between managers and investors. As intangible investments and know-how becomes more important, especially in high-tech companies, the inadequacies of traditional reporting will increasingly leave the average investor at a disadvantage compared with knowledge insiders. In the knowledge economy the gains to specialist know-how will go up: insider information is no exception. As the authors of the US study put it:

“Our tests indicate a strong association between the size of insider gains and the intensity of intangible investment of firms, suggesting that the deficient public reporting of intangible activities by public companies allows their executives to exploit information asymmetries. Since such insider gains come at the expense of less-informed investors, a case can be made for improved disclosure regulation of intangible-intensive companies.”

Two: higher costs of capital

57. Companies with more intangible and fewer tangible assets may find it harder to raise capital than companies with more tangible assets which investors or bankers may regard as security. Banking regulations, for example, may be biased against lending to companies with few tangible assets, which bankers can use as security. This may especially disadvantage young, high-tech companies, with little track record. Clearing bankers in the UK claim to have overcome this problem by lending to smaller, knowledge intensive companies on the basis of their cash-flow or through debt factoring, lending to a company on the strength of the income the company is owed by its main creditors.

A US study explored one dimension of this issue: the costs of capital for about 340 US firms with high R & D. The study found that financial market makers in stocks of R & D intensive firms had a higher “bid-ask” spread for these stocks, which were also less liquid than less R & D intensive stocks. Both these factors tend to be associated with higher transaction costs for investors and higher-cost of capital. This is prima facie evidence that R & D intensive firms face a higher cost of capital in part because capital markets are less informed about the performance of these companies.

Three: overvaluation of intangibles leading to misallocation of capital

The unregulated disclosure of information about intangible assets can create a quite different problem: not too little, but too much capital. Without proper regulation of information disclosure about intangibles it may be possible for companies to manipulate perceptions of their value, leading investors to over-value them. Stocks in some fashionable, knowledge intensive industries – such as Internet related stocks and biotechnology – may have been subject to these fashions, which can lead to companies being over-valued. This over-valuation may attract yet more investment and talent into an already over frenzied industry, to the detriment of other industries in which the value of the assets is more transparent. Thus the inadequate disclosure of information may distort allocation of capital between industrial sectors.

Four: dulled incentives for knowledge workers and entrepreneurs

The current approach to accounting for intangible assets makes it difficult to unravel the contribution that different people and occupations make to a business. As a result it is difficult for knowledge workers to assess their true worth to a business and assess what rewards they should be paid. Knowledge workers face a risk that they may give away their knowledge capital to their employers too cheaply, allow the firm to profit from the knowledge worker’s under-valuation of their human capital. For example, when IBM estimated the value of Lotus’s R & D in progress as worth about $1.84bn. This R & D in progress was mainly made up by the ideas and human capital of people working for Lotus. These knowledge workers were probably relatively well paid, but they may not have calculated that they were collectively worth almost $2bn dollars. Better information about the value of people and their ideas would reduce the information asymmetry between managers and workers, which managers can in theory exploit to their advantage.

Five: increased volatility

Inadequate disclosure concerning the quality of intangible assets may feed volatility and uncertainty in capital markets. Excessive volatility – rapidly rising and suddenly falling stock prices – seems to have afflicted the British biotechnology industry in the past few years. During the early 1990s investors became increasingly attracted to biotechnology companies, which often had made no profits but seemed to have promising drugs in development. The fashion, which overvalued the intellectual capital in many biotechnology companies, produced a surge of investment which inflated stock prices. A series of disappointing results in clinical trials subsequently disenchanted investors, many of whom fled the sector carrying large losses. This extreme volatility has spread uncertainty about the sector and caution among investors. As a result promising biotechnology ventures in the UK find it harder to get backing than they used to. This roller-coaster of exploding and then collapsing stock prices does not help investors to plan and makes the process of allocating capital between different industries more fraught. This volatility might

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be eliminated with improved disclosure requirements, especially for knowledge intensive, listed companies.

62. The analysis above suggests inadequate disclosure of intangibles does threaten significant harms, especially as the economy becomes even more knowledge intensive. Inadequate disclosure can exacerbate information asymmetries to the benefit of insider traders and to the disadvantage of ordinary investors. It can create information asymmetries within companies, to the advantage of managers and shareholders and to the disadvantage of knowledge workers who might under value their work. In some circumstances knowledge intensive companies might face higher costs of capital than they need to; in other circumstances ill-informed investors may pour too much capital into a fashionable, knowledge driven industry they do understand well enough. Volatility and uncertainty makes it harder for capital to be allocated efficiently.
5. NEW MEASURES OF INTANGIBLES

63. Intangible assets such as intellectual capital, human capital, brand value are becoming ever more important. Yet it is very difficult to accurately measure these vital intangible assets within the constraints of traditional financial accounts. Attempts to capitalise R&D or brands have been fraught with difficulty. New, non-financial measures are problematic, unrecognised and untested. The task is not to measure all intangibles, but to value those intangibles that will significantly affect future cash-flows. Yet distinguishing these assets may be problematic. Traditional approaches to valuing assets do not work well for intangibles.

i) Replacement costs

64. One way to value an asset is to assess how much it would cost to replace it. This is difficult to do for an intangible asset such as a skilled workforce or a brand value, which may be difficult to separate from other assets. Assessing the full costs of replacement is very hard.

ii) Income projections

65. Another way to value an asset is to work out the income it will generate over its useful life and work out a net present value. Again it is difficult to isolate the income attributable to an intangible, especially where it is wrapped up with a tangible product. How much is Intel’s brand name worth and how much does it value actually depend on the unique qualities of its products rather than its trade name? A past income stream will be a misleading guide to the value of a product in a market experiencing rapid technological change.

iii) Market valuation

66. How much would people be prepared to pay for an intangible asset? There are growing signs in the US at least of a market in R&D and other intangibles. Yet formal R&D is only one of many intangible assets. Most intangible assets do not have market prices. They are unique, tacit and cannot be traded.

67. These problems bedevil most intangible assets. For example should a customer list be valued at replacement costs (in terms of marketing and advertising spend to build it up again); income projections, from the incremental income due to the list; or a market price, determined by how much it would sell for if it were sold? There are several possible responses to the shortcomings of traditional asset valuation approaches when applied to intangibles.

5.1 New approaches to valuing intangible assets

68. Attempts to value intangibles more reliably are developing from two directions.
First, a range of new approaches to performance measurement and internal corporate reporting, such as the Balanced Scorecard and the European Quality Foundation Model, which attempt to link financial performance to intangible drivers such as employee quality and morale, customer satisfaction and so on. These new models are emerging because managers want more information about intangibles to allow them to be managed more effectively.

Second, attempts are being made to value intangible assets more accurately for investors. These attempts to value intangible assets usually show how non-financial information about brands, patents, research and development or customer loyalty can be linked systematically to a company’s stock market valuation.

These approaches are not exclusive. Different kinds of measures might be more relevant for different audiences. Some of these new measures are primarily designed to give managers and workers a clearer picture of the strengths and weaknesses of their business, to change the way they think and act. Others, environmental and social impact auditing for example, are targeted at a largely external but non-financial audience. Still others may be designed primarily for analysts and investors to provide them with information that will make them better able to assess the contribution that intangible assets make to financial performance.

5.2 Performance Measures

1) Cash Flow Measures

Cash flow is increasingly used as a measure of performance on the grounds that profits and earnings may be a matter of opinion, but cash is a matter of fact. One measure is cash flow return on investment, arrived at by converting profitability data into cash flow and using real gross assets as a surrogate for investment. Shareholder value added measures net operating profit after tax and the cost of capital invested in the business. A related cash value added approach measures past and projected cash flows from strategic and non-strategic investments.

Although there is some general evidence that cash flow generation is better correlated with stock market valuations than profits and earnings, the link is far from secure. A study by accountants Deloitte & Touche, found a high correlation between cash flow and market valuations. However in their work Lev and Zarowin found that between 1977 and 1996 operating cash flows were no better as a guide to market value than reported earnings. Lev and Zarowin acknowledge that cash flow measures might be very useful in special circumstances when a company is in financial distress or a high-tech start-up with high investment in intangibles, e.g. biotechnology companies.

2) Economic Value Added

EVA was developed in the 1980s by Stern Stewart & Co, the New York consultants, as an indicator of returns to shareholders. It aims to strip out many of the anomalies of the accounting system by presenting a simpler measure of the difference between the cost of capital and profit. A related measure of Market Value Added, MVA, compares total market value (less debts) with the money invested in the firm.


Value Based Measures Deloitte and Touche Consulting Group, 1996.
in the form of share issues, borrowings and retained earnings. EVA is designed to focus managers on the
cost of the capital they use and so encourage them to generate more value from the assets they manage. Stern Stewart estimates balance sheets often need restating however to give an accurate picture of the capital employed in the business and often this involves adding in intangibles. EVA has become a common tool amongst US companies, but it is still rare in the UK. In 1996 only three British companies were using EVA although it may be a tool used by financial analysts. Critics argue that EVA is still too historic a measure and does not provide any sense of the linkages between a company’s investment in intangibles and its financial performance. It has also been criticised for being biased against investments in intangibles.

3) European Foundation for Quality Management Model

The EFQM model relates a wide range of weighted non-financial measures to business performance. Based largely on the model used with the Malcolm Baldridge Award for quality in the US. The model distinguishes enablers such as leadership, people management, resources and business processes and results, which include customer satisfaction, employee morale and business results, as well as impact on society. The model aims to gives a more complete picture of the process through which a company sets strategy and manages its assets to deliver business results. This model, or variants of it, is used by some of Britain’s largest companies, among them BT, the telecommunications company.

4) The Balanced Scorecard

The scorecard was first described by Robert Kaplan and David Norton in a Harvard Business Review article in 1992 and in their subsequent book of that title. The scorecard aims to balance financial measures of performance, such as cash flow and return on capital employed, with measures of innovation and renewal (% of revenues from new products, R & D success rate), measures of internal processes such as cycle times, quality and productivity and measures of customer satisfaction and retention. The scorecard is principally a management tool for executives to measure the effectiveness of their business strategy in delivering financial results. It measures the performance of a business only in relation to its strategy. One survey in the US found that almost two thirds of large companies were experimenting with a measurement system akin to a scorecard. Norton and Kaplan estimate hundreds of US companies are using the scorecard, which has been taken up by large British based groups, especially in the financial sector, such as the NatWest Group and The Halifax, the former building society.

The scorecard has been refined to reflect criticisms among practitioners. One problem was that companies often came up with too many measures. One division of Pitney Bowes came up with 500 important measures for its scorecard on the first pass. Norton and Kaplan acknowledge that a scorecard used to diagnose how well a company is doing will probably need more measures than a scorecard designed to set strategy. One recent US development is the Dynamic Balanced Scorecard, which allows managers to track how financial performance feeds into investment in intangibles. The attraction of the Balanced Scorecard is that when it is properly designed it should allow managers at one glance to view the key indicators of business performance and their linkages. One possible cost is that by gathering this information in one tool the company and its executives might be deprived of the variety of information flows a business needs to remain agile.

5) **The Institute of Chartered Accountants of Scotland**

78. The Institute published in 1993 a review of performance measurements used by managers but often not disclosed to analysts. On the basis of its review, the Institute suggests a model based on three main ingredients, supply, demand and corporate responsibility. In the supply category were measures of financial health, such as stock market ratios; human capital, such as education and training, recruitment and retention; physical plant and equipment and natural resources and environmental impact. Under demand it examined customer satisfaction, customer profile and market share. Within corporate governance it examined the company’s compliance with laws and regulations as well as its corporate governance structure. Many of these performance measures are used by British companies, although the ICAS model per se is not.

6) **Ethical and Social Auditing**

79. A company’s performance increasingly depends on its relationships with key “stakeholders” and partners, among them employees, customers, suppliers, the local community and pressure groups. These relationships, which are by their nature intangible, are among a company’s most valuable assets. The argument behind social and ethical auditing is that to audit a company comprehensively one would have to audit these relationships.

80. Relationships with suppliers, customers and employees, for example, are vital to business performance. Relationships with pressure groups and the “community” are may be critical in determining a company’s public standing and reputation.

81. This stakeholder approach was set out in the UK in the Royal Society of Art’s *Tomorrow’s Company* project which published several reports in the mid-1990s. In the UK at least one investment fund has been launched based on the inquiry’s argument that successful companies have strong relationships with partners, suppliers, employees and a sense of social responsibility. Among the company’s which adopts this approach in the UK is the John Lewis, the retail chain, and Unipart, the car components group.

82. The most ambitious attempt to deploy social and ethical auditing in practice is currently underway at Camelot, the UK National Lottery operator. In its version of the process, which is being audited by the New Economics Foundation\(^\text{17}\), Camelot is engaging in a lengthy consultation with representatives of various stakeholder groups to ascertain their judgements of measures that should be used to assess the company’s performance.

7) **Environmental Auditing**

83. Auditing of a company’s impact on the natural environment is increasingly common, especially for large companies in environmentally sensitive industries such as oil and chemicals. Environmental auditing is being driven by a recognition that a company’s ability to recruit and retain staff and customers in large part depends on its public standing and reputation. Environmental responsibility is a key ingredient of this public standing. Both Shell and BP-Amoco publish reports of their environmental performance. The BP Environmental report for 1997 for example, which the company issued in parallel with an Social Report of its work in the community, measures its energy usage, emissions and spillages among other

indicators. The report was audited by Ernst & Young, in line with guidelines issued by the European Federation of Accountants research paper on expert statements in environmental reports.

84. Shell is working with SustainAbility, the leading environmental strategy consultants, to develop an audit which combines financial, social and environmental measures in a so-called “triple-bottom-line.” These environmental measures, including the environmental costs of a product development and process and accounting to the “natural capital” a company relies upon are in their infancy but are likely to become more important for all large companies, especially those with significant manufacturing activities. Techniques are emerging to link these environmental assessments to stock market valuation by treating a company’s environmental performance as creating assets and liability. One recent US study, for example, assessed the link between environmental clean-up liabilities and stock market valuations. A different approach to pricing environmental intangibles for a company, examines the cost savings that compliance with environmental regulations create, along with increased demand from environmentally conscious consumers and improved employee motivation.

5.3 New Measures of Intangible Assets

85. The measures discussed above are mainly designed for managers to better understand and manage soft assets such as employee motivation which have a direct bearing on the financial performance. These new measurement systems often give information about intangibles but they do not lead directly lead a market or accounting valuation of an intangible asset. Below we review recent attempts to value intangible assets such as brands more directly.

1) Human Capital

86. Most recently developed performance measurement systems give a prominent role to assessments of “human capital”, including levels of education and competence, expenditures on training, employee turnover, length of tenure with the company, linguistic and ethnic diversity etc. Lists of measures of employee quality can become very long: the Skandia Navigator developed by the Swedish financial services company mentions at least 26.

87. These measures clearly need to be tailored to a company’s competitive strategy and needs. One company might need a high turnover rate to bring in younger people; another company might need to lower its turnover rate to create a more stable workforce. Even when the formal qualities of a workforce are assessed, it is not necessarily a good guide to how competitive they are. IBM, for example, has always prided itself on recruiting among the brightest graduates. That did not prevent the sharp decline in its performance in the early 1990s.

88. Moreover, linking these employee measures to a market valuation of a company is difficult. One attempt to do this has been made by Joshua Rosett, an economist at Chicago University. Rosett calculated the capitalised cost of published labour contracts in unionised manufacturing companies in the US. Rosett wanted to estimate what it would cost for a company to treat its workforce as an asset which it had to lease,

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rather than workers to which it paid a wage, which is treated as a current expense. Rossett argues that using is technique it should be possible to represent labour as a debt financed asset. Using labour contracts published by the Bureau of National Affairs’ Daily Labor Report, between 1976 and 1987 Rossett was able to extract details of wage rates and other elements of compensation. Adjusting the workforce size for rates of productivity growth, Rossett capitalised the cost of paying these people and compared it with the value of the companies physical assets recorded on their balance sheets. He found that even excluding non-unionised employees the capitalised cost of employing the workforce was generally 1.5 times greater than the book value of traditional physical assets and generally 8% higher than the total accounting assets of the mean company in the sample. Rosett measured the total assets of the mean company in his sample as $2.82bn and the capitalised cost of employing the workforce as$3.3bn. This is a very crude measure, yet it shows that if we had more reliable measures of human capital they would be worth as much as traditional assets.21

2) Customers as assets

89. The more customers a company can retain the less it has to spend on marketing and so the higher its profits should be. There are good reasons for customer relationships to be treated as an asset which yields an income stream over its life-time. The resources a company puts into building up such a relationship could be regarded as an investment in an asset rather than as a current cost, which is how they are treated in most accounts. Most of the new performance measurement systems include measures of customer acquisition and retention, life-cycle and market share, turnover and age profile. As with human capital however, the challenge is to show how these non-financial measures can be translated into financial measures which could be relevant to the accounting or market value of the company.

90. One attempt to close this gap was made by Christopher Ittner and David Larcker, from the Wharton School of Management at the University of Pennsylvania.22 By analysing the American Customer Satisfaction Index, Ittner and Larcker found that a one unit increase in a company’s score on the index, was associated with a $240m increase in the stock market value of an average company, which had a stock market value of about $12bn. In others words, investors seem to regard customer satisfaction as a predictor of financial performance, although they point out that this link varies from being very strong in communications and utilities to being very weak for manufacturing.

91. By examining in detail the customer satisfaction records of a major US telecommunications group and a set of bank branches in California, Larcker and Ittner also established that as customer satisfaction rose, so did customer retention. In telecommunications, for example, they found that a customer with a satisfaction score of 30 (on a scale of 100) was 64% likely to do business with the company again in the following year. A customer with a satisfaction score of 60 was 75% probable to give the company repeat business. The link between customer satisfaction and retention should be strong enough to justify some of the costs of customer relationship management to be treated as an investment. Yet Ittner and Larcker also found that once customer satisfaction rose above 70 - 80% it had no impact on retention rates. In other words, further investments in building customer trust beyond the 80% level were unlikely to yield any clear return in terms of retention. Ittner and Larcker’s studies suggest that there are diminishing returns to investment in customer trust and satisfaction.

92. Customer acquisition is key to growth in new consumer technologies, such as mobile telephones and digital television, where there is often a race between competitors to build up an installed based. These


customer acquisition costs are usually treated as an expense rather than as an investment. As a result financial accounts are far less relevant to market valuations in these industries than non-financial information, such as market size and penetration rates, according to an analysis by Eli Amir, from the Graduate School of Business, Columbia University, New York and Professor Baruch Lev. 23

93. Amir and Lev examined the relevance of financial and non-financial information in determining the market value of cellular telephone companies in the US in the mid-1990s. Cellular telecommunications companies have to invest heavily to acquire customers and to set up an infrastructure to serve them. These costs are expensed so that financial variables such as reported earnings and books values are severely depressed. The total market value of the 30 independent, publicly quoted cellular telephone companies in their survey was $34bn in May 1993, their earnings and cash flows were negative and the median market to book ratio was 12, six times the corresponding ratio for industrial companies.

94. Mobile telephone companies have to spend heavily to acquire customers. At the time of Amir and Lev’s survey commissions of $200 - $300 per customer were being paid. The faster a company was growing its customer base, the more it was spending, the worse its financial performance became. However investors generally viewed customer acquisition as a positive and gave the same company a higher stock market valuation.

95. Lev and Amir’s analysis showed that one their own traditional financial accounting measures such as earnings, cash flow and book value were largely irrelevant to how a company was valued on the stock market. However non-financial information about the potential size of an operator’s market, the make-up of its consumers and its customer acquisition rate, were highly correlated with stock market valuations. When financial and non-financial information was combined the information became even more “value relevant”.

96. The analysis concludes:

“The evidence presented in this study indicates that current financial reporting of wireless communications companies – a large, world-wide and technologically leading industry – is inadequate. Specifically, significant value-enhancing investments in the cellular franchises and in expanding the customer-base are fully expensed in financial reports, leading to distorted values of earnings and assets. Investors are cognizant, to some extent, of these accounting deficiencies and therefore rely primarily on non-financial information.”

97. Lev and Amir suggest that either customer acquisition costs should be reported separately, rather than being lumped in with other salaries and general expenses, or they could be capitalised in same way as long-term contracts, insurance contracts and franchise sales. Different kind of customer information will be relevant in different industries, for example in airlines yields and load factors may be more important. Yet Lev and Amir’s analysis, combined with that of Larker and Ittner, suggests there should be considerable scope for companies to disclose customer recruitment, retention and satisfaction information, with their financial reports, especially as information technology systems make it easier for companies to collect and analyse this information.

98. The significance of Lev and Amir’s analysis extends well beyond the cellular telephone industry. As they put it:

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“In the cellular industry, the value-relevance of non-financial information overwhelms that of traditional, financial indicators…..we expect this to be the case in other science-based, high-growth sectors.”

99. They found, for example, that financial accounts were just as inadequate as a guide to the market value of biotechnology companies. This suggests that in a wide range of fast growth, high-technology, consumer related industries, where growth is driven by investments in intangibles such as brand recognition and research and development, financial reporting needs to be augmented by relevant non-financial information. The nature of this non-financial information will vary from industry to industry and this kind of approach may not be relevant for more mature industries. This suggests that rather than seeking to draw up accounting standards which are global and timeless, regulators and professionals should focus on standards which may be industry specific and revisable to take account of the industry’s special features and stage of development.

3) Brands

100. A strong brand is regarded as an asset by managers and investors but brands are not valued as assets in most financial accounts. Internally developed brands are not recognised as assets (apart from trademarks) while brands purchased through corporate acquisition are. Expenditures incurred to increase brand values, such as advertising and endorsements, are expensed as costs rather than capitalised.

101. This is one reason why companies with brand intensive products often have a higher market-book ratio than companies that do not have strong brands. Although definitions of brands differ, the underlying idea is that of a distinctive brand name, with which the consumer has a high level of awareness and a willingness to pay either higher than average prices or make higher than normal purchase frequency. A strong brand can give a company some of these benefits: greater customer loyalty, less vulnerability to competitive marketing or marketing crises, larger margins, more inelastic customer response to price increases, opportunities for licensing and brand extension.

102. The valuation of brands is fraught with difficulty and attempts in the UK to put brands on balance sheets have been highly controversial. Marketing specialists, such as Interbrand however claim to have developed much more reliable models for valuing brands. The Interbrand approach includes an attempt to assess brand earnings through cash flows attributable to licenses and related sales. Brand strength is scored against seven criteria: the market in which it participates; stability and customer loyalty; brand leadership in a market; long-term investment in the brand; geographic scope and degree of protection. This brand score is combined with the assessment of brand earnings to yield a brand valuation. Interbrand’s clients use its software to track and manage the value of their brands.

103. Mary Barth, a professor at the Graduate School of Business, at Stanford University and a team of researchers has examined the relationship between brand values and market values between 1991 and 1996, for 1,204 brands owned by 183 firms based on a ranking of brands published by the US magazine Financial World.24 Firms frequently own more than one brand. In 1995, for example, Philip Morris had 14 brands, valued at $65.663bn, with Marlboro valued at $44.6bn and Kraft, at $5.7bn. The mean market value of firms in the sample was $13.7bn, while the book value was $3.7bn, suggesting that the firms had substantial, unrecognised assets. Their analysis found that the average firm had brands estimated at $4.2bn, worth about 44% of average market value and a ratio of brand values to book value of 209%. Their analysis found a significant correlation between these brand values and market valuations, which suggests

that investors use non-financial information to reach a valuation of a brand as an asset while accountants do not, at least as far as internally generated brands are concerned.

104. Much needs to be done to refine brand value analysis before these estimates could be included on balance sheets. However the analysis presented by Barth et al suggests that financial accounts would be made more useful and relevant for investors if they included adequately regulated and comparable data on brands.

4) Research and Development

105. Research and development is one of the most fundamental processes through which companies invest in knowledge creation. US firms invest perhaps $150bn a year in R & D, with the aim of creating new products and processes which consumers and investors will value. This R & D expenditure should be seen as an investment to create an asset – knowledge capital – which in turn produced a flow of income. However in the US at least R & D spending is generally treated not recorded as an asset but treated as an expense. That is because in the eyes of regulators at least the connection between the cost of R & D and the benefits are too opaque. R & D is risky and often projects do not lead to any specific benefits. Thus to allow managers to capitalise R & D as if it were an asset would be to give them too much latitude to “massage” accounts.

106. Although some large scale studies have shown a close association between R & D expenditure and subsequent gains in productivity, earnings and stock returns, substantial difficulties remain in valuing R & D accurately at a company level. From an investment management point of view, however, the level of an individual firm’s total R&D, as it is disclosed in financial statements is too coarse an indicator of future performance. There are various kinds of R&D, each with a different impact on future cash flows. Some R&D is basic research which may be highly risky but which might provide the basis for substantial long-term growth. Other forms of R&D, for example software development, is aimed at developing products with a short life span. This product development R&D differs from research designed to make production processes more efficient.

107. Thus attempts to value corporate R&D face a conundrum. It is clear that some of the money invested in R&D will generate future benefits and should not be treated as just another business expense. However it is not clear in advance which portion of R&D is going to be most successful and capitalising this spending on the basis of the cost of R&D will give a misleading impression.

108. New measures of intangible assets need to find a way to avoid the pitfalls of both approaches. One possibility is that the market might develop its own valuations for R&D which accountants and investors might learn from. One recent US study of 375 corporate acquisitions between 1985 and 1996 which involved the purchase of “R&D in progress” found that 147 of the deals took place between 1994 and 1996.26 In these deals the R&D purchased amounted to 75% of the purchase price of about $60m for the average deal. These acquisitions which were becoming far more common were in essence a trade in R&D.


Accounting regulations in the US mean that this acquired R&D has to be valued at a fair market price, through an often elaborate procedure involving expert review, market analysis and financial calculations. This procedure for valuing acquired R&D could provide a model for a more generalised approach. Take the case of IBM’s 1995 acquisition of Lotus Development Corp as an example.

IBM acquired Lotus for $3.2bn in July 1995. The company’s software technology was valued by dividing it into current product and research and development in progress, i.e. new ideas and products in the pipeline, some of which were still in early development and nowhere near technical feasibility. IBM determined the fair market value of this acquired R&D to be $1.84bn, a valuation which was approved by independent appraisers. Lotus’s tangible net assets were $305m and identifiable intangible assets were trademarks ($369m), the assembled workforce ($90m), employee agreements and long-term contracts ($79m). In the 374 other cases the mean acquisition price was $62m, with acquired R&D accounting for 72%. Subsequent analysis of the stock market performance of the acquiring companies showed that investors regarded the fair market values attached to the R&D as relevant and reliable, while the residual goodwill generated by the deals was generally discounted. This trade in R&D intensive companies is likely to grow, as the economy itself becomes more knowledge intensive. The fact that investors seem to regard these fair market values of R&D as reliable suggests these approaches could be used to value a company’s R&D when it was internally generated.

This study suggests that a market for knowledge capital is emerging, at least in the US. It has long been held that R&D and other forms of knowledge capital are hard to value because unlike machinery, buildings and other forms of property, knowledge is not actively traded. The emergence of markets where R&D and other intangibles are traded should be closely watched since prices established as reliable in these markets could provide guidelines for changes in accounting procedures.

A further development is the use of real options, within companies and between companies and universities to value technology and R&D. Attempts to value R & D are bedevilled by the uncertain pay-off from research. That is why there is such opposition to investment in research being capitalised as an asset. However “options” models largely borrowed from the financial markets may help companies and investors to overcome the problems of valuing research in the context of great uncertainty.

In theory “options” are very simple. Take the film industry as an example. Studios routinely buy options on thousands of scripts that never get made into films. When the studio buys the option to the script, it purchases the option to make it into a film in future, but it is not obliged to do so. Holding an option on a film script has a value even if the film does not get made. The script is taken off the market and so denied to potential competitors. The studio acquires some additional flexibility to deliver a wider range of films to a fluid and changing market. Options are a way for people to hedge their bets until the very last moment when they have to make a decision to either go ahead or pull out. In markets beset by uncertainty buying this extra time and space to make a decision has a value in its own right, even if the project does not come to fruition.

Options are commonly used in financial markets, for example in markets linked to trade in minerals and agricultural commodities. Financial traders can trade in the options on these products without every touching a soya bean or a piece of pork belly. Stock options are increasingly used within US and some extent UK companies to reward staff. Staff are awarded stock options, which they usually can only exercise between three and five years later. If the stock price is higher than it was when the option was awarded they make a profit when they exercise it: the option is “in the money”. If the stock price is lower than the price at which the option was awarded, the option is “out of the money.”
115. This options approach is increasingly used by companies acquiring research and technology from universities in the US. Industry support for university research in the US rose from $113m in 1975 to $1.5bn in 1995, according to the National Science Foundation. Universities earned a licensing income of $350m from royalties in 1993. Increasingly companies are using an options approach to acquire and fund research in stages. By buying an option on a piece of university research the company typically funds patent applications and pays an option fee to the inventor usually to allow further research. At the outset university research projects in basic science often hold a great deal of promise: they could go up in smoke or they could create a new market. It is difficult to tell. The more uncertain and volatile the pay-offs from the project, the more it makes sense for a company to hold an option. By buying an option the company can get its foot in the door, without either stumping up the full amount that would be required to take the idea into product development or alternatively pulling out and risking losing a great product. At each stage of the research the company can either choose to renew the option, terminate it or even sell it to another bidder. As the research project progresses it should be possible for the company to gather more and more information about its likely prospects. The less uncertain the outcome of the project becomes – either it will be a flop or it might well make it – the less sense it makes for a company to hold an option. By then it has to make up its mind whether to pull out or to back the project to completion.

116. The details of these options are rarely disclosed but they provide a way for companies, investors and outsiders to value the underlying asset: the knowledge embedded within the university research programme. The model used when companies buy research from universities can equally well be applied within large companies with large and diverse research and development portfolios.

117. One standard approach to the use of options recommends companies should assess the likely pay-off from their research projects against the volatility involved in the project – from science, technology and markets. The least volatile projects with the highest pay-offs would be classified as “Go Ahead Now”. The least volatile projects with the lowest pay-offs should be classified as “Never”: if they are not going to make money now, there is very little prospect they will do so in future. Between these two clear outcomes lie at least four possibilities: projects are either “Maybe Now”, “Probably Later”, “Maybe Later” or “Probably Never”. The options based approach to valuing R & D allows a company to track a project as it travels through these categories. A project which improved their standing from “Maybe Later” into “Maybe Now” would gain a higher rating than one which moved from “Maybe Later” to “Probably Never”. Projects in different parts of this “options space” would be valued differently. A project categorised as “Never” or “Probably Never” would be written off as an expense. But one which landed in the “Go Ahead Now” box might be capitalised as an asset.

118. Merck, the pharmaceuticals group, already uses a highly sophisticated “options” pricing model to value its R & D portfolio. On average it costs about $359m and takes ten years to bring a drug to market. Even then, seven out of ten drugs that make it to market then fail to return the cost of the capital the company invested in them. Add to that, the uncertainties of interest rate and currency fluctuations and regulatory and political changes, and the job of valuing pharmaceuticals research becomes extremely hard. Merck invests $1bn a year in research but according to its chief finance officer Judy Lewent the risks and uncertainties attending this spending were not properly valued until the company adopted an “options pricing” model, akin to one used in financial markets. Lewent explained:

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“Options analysis, like the kind used to value stock options, provides a more flexible approach to valuing our research investments than traditional financial analysis because it allows us to evaluate those investments at successive stages of a project. When you make an initial investment in a research project, you are paying an entry fee for a right, but you are not obligated to continue that research. Merck’s experience with R & D has given us a database of information that allows us to value the risk or the volatility of research projects, a key piece of information in options analysis. If I use option theory to analyse that investment, I have a tool to examine uncertainty and to value it. When I look at investments from this perspective, I am able to value the project if it is successful. In other words, I know the value of a new product. But I am also able to value the project if it doesn’t result in a new product. Because I know we will have gained new scientific information that will help us in future. To me, all kind of business decisions are options.”

119. This approach to valuing R & D blurs the line between financial market valuations and those made internally within a company. In volatile markets, where prices and demand are always in flux, it’s hard to predict how a particular investment will ultimately influence a company’s value. The options approach shows how a company can incorporate the financial market’s measures of value, under uncertainty, into its own strategic decision making. Take the oil industry as an example. Oil companies place far greater emphasis than they used to on exploration to find new reserves. This exploration is akin to research and development: it is highly speculative and uncertain, especially at early stages of the process. To counteract this uncertainty oil companies have become increasingly sophisticated in the way they price the risks involved by using real and financial options.

120. First, exploration creates a set of real options. If it is successful the project may lead to wells being drilled and oil being pumped. But even if it is not fully successful the exploration may have generated useful knowledge and diverted competitors. The project’s full value is the value of all the options it creates, not just the value if it is successful. Second, oil companies increasingly use information from financial markets to value these real options. An oil field exploration contract is very similar to a call option contract on oil: both provide, for a cost, a right to get oil at some point in the future. The price of the call-option, which is traded in financial markets is a guide to the value of the real option, which is entirely internal to the company. Third, oil companies buy and sell oil related securities to temper the price risks inherent in oil exploration. The financial options help to offset the risks in real life.

121. According to advocates of the “real options” approach companies in many different industries will have the opportunity to follow the oil companies by using financial instruments to help them to value their options for creating new revenue streams. The real options approach is in its infancy. The mathematics involved sometimes appear fearsome. There are real limits to how far it can go. However it holds great promise, perhaps especially for valuing intangibles.

122. Intangibles are such a problem because it is so difficult to reconcile the valuations reached by the financial markets – the market value - and the valuations arrived at by accountants and managers – the book value. The real options approach deploys powerful computers, and models and information from the financial markets, to blur the line between financial market valuations of research and internal company valuations. In theory the market value and the accounting value of an asset should both become the product of a much more closely linked stream of information and models. This is the larger significance of the real options approach: it blurs the line between financial markets and traditional accounting. Indeed one implication of this approach is that a company might become less neatly bounded and defined as a financial entity. For example, in theory, investors should be able to buy shares not only in Merck, the company, but financial instruments which track individual Merck research projects or even individual

research teams. Thus investors could invest not only in the company as a whole, but in particular bits of the company that they liked. Investors’ behaviour would help the company to value its own projects and set its strategy. At the moment intangibles pose such a problem because market value is determined and revised constantly whereas book values are only revised periodically. It is surely technologically feasible for financial markets and corporate strategy, market values and book values to be in constant interaction and thus more reconciled.

5) **Intellectual Property and Patents**

123. Patents are one of the most defined forms of intellectual property and with the advent of computerised patent databases, particularly in the US, it is now possible for researchers to systematically link a company’s track record in patenting to its stock market performance. A patent is a temporary legal monopoly granted to inventors for the commercial use of an invention. Most of the analysis of the link between patents and corporate valuation has been done in the US where a patent must be novel, useful and non-trivial.

124. Patents are increasingly becoming a focus for intellectual capital management within companies. One of the most impressive examples is the intellectual capital management team at Dow Chemical, led by Gordon Petrash, which took over management of Dow’s 29,000 patents. The team found that 200 patents were considered key to the company, others it was using but were not critical, some were potentially valuable and many were not used at all. Dow’s adopted a six step approach to patent valuation. First it created a global company-wide database of patents. Then it classified patents on the basis of whether they were being used, would be used or were not being used. By linking the patents to the company’s business strategy a valuation for the patent, based on the revenues it was expected to generate, was arrived at, by convening a panel of experts to assess the technology and its market. Then the company carries out an assessment of the likely competition and the costs and risks of investing in the patent. The benefits of the approach are already evident. In the first year the team saved $1m on patent maintenance costs by deciding not to continue maintenance of patents that were not linked to the company’s business strategy. In less than five years the team increased the licensing income from patents, from $25m in 1994 to $125m in 1998.

125. The Dow case shows that companies are developing more systematic internal measures of the value of their patents. At the same time researchers have begun to unravel the links between patents and stock market values. Patents may be a better measure of a firm’s knowledge capital than spending on research and development. Patents are a measure of output, while spending on R & D is a measure only of input. The strength of a company’s patent portfolio can be assessed from several different vantage points: the number of patents; the frequency with which they are cited in other patents within the industry; the frequency with which they are cited in scientific research and the age of the portfolio. Thus examination of a company’s patent stock could be much more informative than a catch-all valuation of R & D, which would lump together pure and applied research, product and process development, successful and unsuccessful projects.

126. A team of German and US researchers examined the German holders of 962 US patents and found a small proportion of highly cited patents were very valuable. They concluded that a single additional US citation to the patent implied an additional $1m in economic value. 31

127. A US study of the gap between the market and book value of 11 large semi-conductor firms between 1977 and 1990, examine how much of that gap could be explained by the firm’s research and

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This analysis found that patent citations were a better guide to the company’s market value than simply the number of patents and became even more relevant when combined with measures of research and development spending. A third small scale study of US biotechnology companies came to similar conclusions. 33

One of the most ambitious attempts to test whether patents are a good guide to a company’s stock market valuation has been made by a team of researchers led by Bronwyn Hall of the University of California at Berkeley and Nuffield College Oxford. 34 This research examined a computerised data base of about 1m patents held by 4,800 US manufacturing firms, over a 30 year period to explore the contribution of R & D, patents and patent citations to valuations of a company’s intangible assets. A quarter of the patents had no citations, 150,000 had just one citation, 125,000 had two cites and 4 patents had more than 200 citations. The most cited patent was a catalyst invented by Union Carbide, which had 227 citations in 1995. Their research found that R & D stock was a better guide to the scale of intangible assets or knowledge capital than stocks of patents, but that patent citations were more relevant than the number of patents. The most successful approach was to measure the number of patent citations in combination with the amount spent on R & D. This approach found that an increase of one citation per patent was associated with an increase in the market value of the firm of three to four per cent.

Hall and her team then looked at five groups of firms: those with an average less than four citations per patent, those with between four and six cites per patent, and those with six to ten, ten to twenty and more than twenty cites. This analysis found that the 82 firms with more than 20 citations per patent had a stock market value 55 – 60% higher than would have been expected given their R & D capital and the number of their patents. So while patent citation data is generally relevant it becomes particularly relevant for companies which focus their research on fundamental innovations which are widely cited in other patents. Information about patent citations would be potentially very useful for investors to judge these high tech, science based companies, especially in electronics, semi-conductors, pharmaceuticals and plastics.

The finding’s of Hall’s research were borne out by a more detailed examination of the quality of patents in 398 US firms in four patent intensive industries: pharmaceuticals, chemicals, communications equipment and electronics. 35 This study examined several aspects of the quality of patents, including their science linkage (a measure of how closely related to basic scientific research the inventions were, based on how frequently scientific papers were cited in the patent); their industry impact (how frequently a company’s patent was cited by other patents) and life cycle (how young or old a patent portfolio was). The analysis found that science linkage and industry impact were both strongly related to a company’s market to book value and its subsequent stock price performance. For example chemical companies with a low science linkage and low industry impact in their patents had a market to book ratio of 2.024, while those with a high linkage has a 25% higher market to book ratio. The year ahead stock returns of companies with high impact patents was 11.2%, about 27% higher than those with low impact patents. Further research on the panel of companies found that the science linkage measure of a patent’s quality was associated with markedly higher market-to-book ratios: science based patents were associated with investor’s perceptions

that the company was capable of long term growth. However near term stock performance and short term returns was more associated with the level of innovative activity measure by the volume of patents the company issued.

131. The table below sets out some of these figures from an analysis of AT & T’s performance calculated by Professor Baruch Lev.

### AT&T Patent Index

<table>
<thead>
<tr>
<th>Year</th>
<th>AT&amp;T</th>
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<td>58</td>
<td>1.94</td>
<td>1.37</td>
<td>1.81</td>
<td>0.75</td>
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</table>

132. Row one of this table shows that AT&T generates far more patents than the average firm in the industry. However just as important, in terms of the link to share prices, is the quality of AT&T’s patents. The second row is a measure of the importance of AT&T’s patented inventions to the rest of the industry. It measures how frequently AT&T’s patents are cited in other products used in the industry. The rate of citation is much higher for AT&T than for other firms: that means the innovations AT&T is generating are far more fundamental than those generated by other companies. The third row is a measure of the scientific quality of AT&T’s patents. This is a measure of the quality and radical character of AT&T’s inventions. This column measures how frequently AT&T’s patents are cited in scientific journals and patents claimed by scientific research institutes. Here AT&T’s lead over the industry is even greater, suggesting that it is engaged in far more basic, fundamental and radical research. Finally, the fourth column measures the median age of the patents issued by the company. This is a proxy for the rate of technological change and the velocity of knowledge generation. This column shows how much new knowledge a company is generating. The lower the number the better. Again AT&T is clearly ahead of the industry.

133. This analysis shows that patent data can play a very useful role in some industries and in some countries to provide investors with information about a company’s knowledge capital. Measures of the quality of patents, such as the science linkage and industry impact, are one indication of how valuable a company’s knowledge is to other companies and how fundamental is research is. Provision of this kind of information on a regular basis, for appropriate industries and companies, would help investors to understand the link between investment in R & D, the creation of knowledge capital and subsequent financial performance. This kind of analysis should become more feasible with the spread of computerised patent databases.

134. Of course there are limitations as well. Patenting is more common in some industries, such as pharmaceuticals and chemicals, than it is in software. Patenting regimes differ around the world. US companies are more likely to patent than companies from some European and Asian economies. Patent data is not a cure-all to the problems of valuing knowledge capital. However when it is applied to the right industries and companies, and when it is combined with data on other intangibles such as R & D, it can play a very useful role.
5.4 Bringing the New Measures Together

135. New performance measurement models are increasingly being used within companies to help managers track the role of intangibles such as employee morale and customer satisfaction in generating financial results. These systems are yielding far more detailed information about intangible assets than managers used to have. At the same time, attempts to explain the role intangible assets play in determining stock market valuations are becoming more sophisticated. These measures of intangible asset value often use non-financial information, for example, of brand strength, to illuminate how investors seem to reach market valuations. These measures would make market valuations more reliable and could in turn help to inform accounting valuations of a company’s intangible assets. The non-financial information needed for such approaches is being generated by the new performance measurement systems many companies are now adopting.

136. The question is how these new measures should be best developed and integrated. Three possibilities are raised in this section. First, traditional financial accounts could remain the focal point of corporate reporting, but they could be augmented where appropriate by non-financial information that would help investors to value intangibles. This is the incrementalist approach. Second, these new measures could be incorporated into new balance sheets – so-called Intellectual Capital Balance Sheets. These would incorporate traditional financial information but they mainly focus on measuring intangible assets: human capital, customer capital, structural capital and so on. This is a revolutionary approach. Third, the job of valuation may become increasingly market-based, with the use of devices such as real options. This approach would blur the line between financial market valuations of intangibles and internal corporate valuations. This is a hybrid approach.

The Incrementalist Approach

137. The Incrementalist Approach seeks gradually to fill in values for the intangible assets which traditional balance sheets overlook. Traditional financial accounts would remain the focus of corporate reporting but they would be augmented by relevant, robust information on intangibles, with a proven track record for being linked to market valuations: patent citations, brand values, customer loyalty and so on. This approach would utilise accounting procedures used routinely in corporate acquisitions to value intangibles as well as quasi-market valuations yielded by techniques such as real options. This Incrementalist solution would comprise at least these steps.

138. First, this approach would be based on non-financial measures which were relevant, relatively easy to collect and with a proven, robust relationship with market value. These measures would differ by industry. The aim would be to set industry-specific standards for reporting robust, non-financial information on intangibles which could be independently audited. In high-tech industries, with heavy investment in research and development, for example, patent citations, fair market values for related R & D might be highly relevant. In other industries, such as fast moving consumer goods, estimates of brand value would be more relevant. It would be a mistake to aim for global standards, for all industries. Instead the aim should be to develop measures relevant to particular industries and which could be adjusted to take account of the stage of development a company has reached. The kind of measures relevant for a large mature company in an industry would be different from those applicable to a small company.

139. Second, companies should provide safe-havens in their accounts where intangibles could be valued as assets without putting them on the fully-fledged balance sheet. These safe-havens would allow companies to adopt a more flexible approach than the balance sheet per se, by stating possible ranges for intangible asset values. The safe haven would be a way of putting valuations of intangibles in “quarantine” before allowing them to migrate onto the balance sheet.
Third, companies should provide a set of revisable rolling accounts. For example, it may not be wise to capitalise the R&D of a high risk new technology business at an early stage of development because the future benefits would be so uncertain. However at some point when the technology and the market is less volatile capitalisation may become more realistic. At that point it might be worth restating past accounts to show what they would have looked if the R&D had been capitalised. Accounts are a financial history of a company. Like most histories they should be revised in the light of new information.

The incrementalist approach is designed to allow companies gradually combine traditional and novel approaches to valuing assets. It would allow companies to deal more effectively with volatality and uncertainty, by providing safe havens and revisable rolling accounts. Industry standards for disclosing relevant non-financial information about intangibles would allow more robust links to be made between investment in intangibles and market valuations. Traditional financial accounts would become more relevant and responsive by making them more flexible and adjustable to suit specific circumstances.

The greatest merit of this approach is its gradualism, which would allow investors, managers and regulators to learn as they go. For all its shortcomings financial reports are familiar formats. This approach would attempt to build on that strength rather than risk throwing the baby out with the bath water. However there are risks as well. Intangible values could be manipulated by managers to boost profitability. If expenses incurred in R & D were recorded as a capitalised asset rather than a current cost, set against profit, then short-term profitability would be boosted, at the expense of a lower return on capital. This approach would create a patchwork quilt of methods to value companies. This might undermine the consistency and reliability of the accounting framework. There may be a risk in not going further faster as well. Arguably the incrementalist approach would not make intangible assets prominent enough. This is why a more radical approach might be needed.

The Radical Approach

The best known of these new balance sheets is the intellectual capital report set out by Skandia, the Swedish insurance company, issued in 1996 an intellectual capital report, to go alongside its traditional financial accounts. This report divides the capital of the company into a tree. Skandia divides its market value into financial capital (realisable assets, close to book value) and the rest, which it counts at intellectual capital. It then divides intellectual capital into human capital (the quality of the workforce) and structural capital. By structural capital Skandia means what is left of value in the company even when the people are taken away. Structural capital is divided into customer capital (the company’s relationships with its customers) and organisational capital, which means organisational knowledge and routines, which allow the company to innovate and process its work. Innovation capital is divided into intellectual property, such as patents and copyrights and other intangible assets. Skandia has developed an extensive list of measures that should allow it to measure these different kinds of capital. Skandia also employs a navigator system, akin to the Balanced Scorecard.

Another approach to come out of Sweden is the intangible asset monitor developed by management consultant Karl Erik Sveiby. This is far more focused and compact than the Skandia model. Sveiby divides intangible assets into three main categories:

- **external structure** - by which he means the quality of relationships with suppliers and customers;
- **internal structure** - by which he means process efficiency, innovative capacity;
- **people competence** - the quality and motivation of the workforce.

Sveiby then analyses these intangible assets according to three criteria: operational efficiency; growth and renewal; stability/instability. He has applied this model to a company in Sweden, Celemi, a publishing company, using relatively simple measures. The Sveiby model is simpler than the Skandia approach and has much in common with Norton and Kaplan’s Balance Scorecard.

Finally, the Intellectual Capital Index of IC Index was developed by Goran and Johan Roos. It provides an intellectual capital tree which divides the intellectual capital of a business into human capital, organisational capital and customer relationships. A company’s organisational capital can then be further divided into business and renewal and business process capital. The process of drawing up such a balance sheet often forces companies to focus on the intangible assets and competences which most matter to them. Intellectual Capital Services, the UK based consultancy which markets the index as a business tool, reports that companies generally focus on four main components:

- Relationship capital, measured by growth in number of relationships, levels of trust, customer retention, quality of distribution channels.
- Human capital index, measured by value creation per employee, training and education quality, employee motivation and morale.
- Innovation capital index, measures by ability to generate new ideas and turn them into products, while improving productivity.
- Infrastructure capital index, measuring tangible and intangible assets which allow the company to get its job done.

Intellectual capital measurement is the fastest growing part of the knowledge management market. It has many attractions, at least in theory. The process of drawing up an intellectual capital balance sheet focuses managers on intangible assets. The process helps managers and investors to visualise the role intangible assets play in creating corporate value. These new measurement systems all use similar sorts of measures of human capital, customer relationships and structural capital for example embedded in corporate relationships and joint-ventures.

However there are also significant downsides. Many of these new systems appear elegant but would require large investments in data collection. Many measure “assets” which have no obvious bearing on financial performance. The Skandia approach, for example, issues in a long list of possible measures.

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38 This approach is set out in Johan Roos et al “Intellectual Capital: Navigating the new business landscape.” Macmillan Business, 1997
For example, it recommends companies measure the proportion of the workforce below the age of 35, with no indication of whether the number should be above 50%, 30% or whether it should be going up and down. The new balance sheets seem to endorse the idea that intangible assets can be tied down and measured if only accountants had enough time and information. This is a mistake: intangible assets are highly complex and fluid, their value is volatile and highly context dependent. These IC inventories could prove costly and cumbersome tools, which would be too slow to adapt to fast moving markets. One test of their effectiveness would be to apply them retrospectively. Had the Skandia IC balance sheet been applied to IBM in the mid-1980s, it would probably have shown a highly efficient, well resourced company, with lots of innovative ideas, bright people and happy customers. It would not have highlighted the way IBM’s position was being eroded by fast moving competitors, with radical ideas, who were operating at the margins of IBM’s mainstream markets.

150. These IC measures may prove a very useful way to visualise and present the intangible assets of a company, especially when combined with ethical and social audits now becoming more common among large companies. They also overlap with new performance measurement systems such as the Balance Scorecard. However they will be less useful, as they stand, in putting a reliable valuation on intangible assets for outside investors.

**The Hybrid Approach**

151. In ways the Hybrid approach is even more radical. It would involve far more sweeping changes, not just to how managers and accountants value intangibles but how society as a whole values them. An underlying assumption of the debate about intangibles is that there should be an accounting solution to the difficulties of valuing them. This accounting solution may involve gradual or radical reform, but it would essentially involve accountants in drawing up a balance sheet for company.

152. The Hybrid approach would explicitly recognise that more reliable values for intangibles will only emerge if there are more open, active and thick markets to trade them or at least financial instruments which are linked to intangibles. There are two main attractions to the development of new markets for intangibles.

153. First, intangibles are difficult for accountants to value because they are so volatile and uncertain, their value shifting with markets and demand. Accounting measures of intangible value – whether traditional or radical – are too slow, cumbersome and backward looking to keep pace with this change. We need to constantly adjust the value of intangibles depending on market conditions, technologies, regulatory changes and so on. Financial market models are much better at this than accounting measures.

154. Second, accounting, like the tax system, is at its best when it is recording observable, discrete transactions. Intangible assets create a problem for accountants because they are difficult to disaggregate and so as a result they are hard to trade. Thus to value intangibles either accountants need to acquire radically new skills, to value assets which are not traded, or we need to create open markets and a trade in intangibles which accountants can record.

155. This Hybrid approach then argues for the creation of new financial markets which would allow the trade of options on intangibles. This would allow investors to invest in companies, as combinations, but also on a disaggregated basis. Thus an investors may wish to invest in a company such as Nestle, which holds many consumer brands, but it may wish to invest in a particular brand as well, for example Kit Kat. An investor may wish to buy shares in Manchester United, but could also buy options in Ryan Giggs or David Beckham. An investor may wish to invest in Merck but may also want to invest in a particular branch of its research. The intangibles options market would allow investors this flexibility.
156. This approach would involve the creation of a new breed of financial markets: the intangible options market, a market-based system for valuing the future prospects of intangible assets which make up a business. The valuations reached in these markets could be reflected in company accounts. Accountants would not attempt to measure intangible values themselves, but simply record the values put on intangibles by the financial markets.

157. The great merit of this market-led approach is that accounting and market-based measures of value would develop in tandem. Companies would be pulled to provide more information to investors to inform their trading in these markets. The focal point would not be new balance sheets but new markets.

158. There are obvious downsides and limitations though. There may be limitations to what kind of intangibles can be traded. People may not object to financial options being linked to research programmes but might balk at the idea of talent-based options, for example linked to the performance of a research team, being traded on open markets. These option markets might help investors deal with the uncertainty of intangibles but may also spread uncertainty and volatility. By disaggregating the value of a company’s intangibles this approach might create the impression that a company is no more than a temporary coming together of people, ideas and resources, which can easily be broken up and reconfigured.

6. CONCLUSIONS: THE WAY FORWARD

1. The gap between the stock market values of many companies and their accounting or book values is growing, especially in high-tech and knowledge intensive industries, in which companies invest heavily in intangible assets such as R &D and brands. As the economy becomes increasingly “knowledge-driven” these intangible assets will acquire more value in all industries, from retailing and agriculture to software and biotechnology.

2. The accounting system was not designed to deal with companies which invest heavily in intangible assets. It performs poorly in measuring high-tech sectors such as cellular telephones, pharmaceuticals as well as brand intensive companies in consumer industries.

3. This mismatch between the value which investors put on a company and the value which accountants record on formal balance sheets is not simply the product of the scale of investment in intangibles. Just as unsettling for traditional financial accounting is the volatility, uncertainty and pace of change associated with higher investment in intangibles. Accounting is not just poor at dealing with intangibles but poor at dealing with rapid and discontinuous change.

4. The case for reform to improve the way that companies disclose information about intangibles and account for their value is considerable. However it cannot be sustained on the basis of the need to defend traditional accounting, administrative tidiness or still less to defend the professional position of accountants, which is increasingly under threat from the spread of alternative systems of valuation developed outside the profession.

5. The case for reform is that the mismatch between market values, which include an assessment of the value of intangibles, and book values: creates space for insider trading; may lead to capital being misallocated; raise the cost of capital for knowledge intensive companies and increase volatility and uncertainty.

6. A new approach to disclosing information about intangibles and valuing them needs to start from a recognition of the special characteristics of intangible assets, which are highly context dependent and variable in their value. The value of these assets cannot be “added-up” in the way that traditional, tangible assets can be accounted for. In particular, intangible assets have become so valuable for companies, in large part because they are difficult for competitors to imitate, copy or acquire. Intangible assets are difficult to trade and exchange. The features which make intangible assets so valuable to companies, also mean that they are difficult for to value for accountants and traders.

7. This implies that any new approach needs to be multi-disciplinary and multi-institutional. More reliable accounting measures of intangible asset values will only emerge with more reliable market based measures of their value. The two must develop in tandem. There is no pure accounting solution to the valuation of intangibles.
8. The need for more and better information about intangibles is reflected in the rise of new business performance measurement systems such as the Balanced Scorecard, EVA and the European Quality Foundation model. All of these aim to provide managers with a way to understand how intangibles such as customer loyalty and human capital, generate financial results. These new approaches do not provide a ready way to value intangible assets per se, but they provide much useful non-financial information, which could help outsiders to better assess the value of intangibles.

9. There is growing evidence of industry specific, non-financial measures which would help to put a more reliable value on intangibles. Research shows that patent citations, some aspects of R &D, customer satisfaction and loyalty, human capital and brand values, can all be systematically linked to stock market valuations given to companies. This non-financial information is highly “value-relevant”.

10. This suggests that the immediate focus should be on industry specific best practice and regulatory changes to improve the disclosure of non-financial information about intangibles, alongside traditional financial accounts.

11. This new approach cannot be developed by regulatory intervention alone. Public pressure can play a vital role: it already has in pressing oil companies to report on environmental and social issues. Market pressure will also play a role: there is some evidence that companies are rewarded and more trusted by analysts for providing more relevant non-financial background information about their research. When a financial announcement is made the non-financial information plays a role in setting the context and background.

12. The most promising approach then would be to develop a set of industry specific standards, to augment, complement, revise and amend company accounts, to provide better information about intangibles and allow them to be valued more reliably. This could include the creation of “safe havens” in accounts to value intangibles and the provision of revisable, rolling accounts, which could present different ways to value intangibles. This would provide outsiders with multiple and overlapping perspectives from which a company could be valued.

13. This approach needs to be combined with the development of new markets to trade intangibles or financial instruments linked to intangibles: an intangibles options market. These market-based measures of intangibles could develop on emerging models to value intangibles through options pricing models. This approach would blur the line between financial market models and accounting models of value, thus helping to reconcile market values and book values.

14. Finally, new intellectual capital balance sheets, of the kind pioneered by Skandia can play a very useful role in helping to present and visualise the intangible assets a company relies upon. These new approaches are valuable but could also be as cumbersome and slow-moving as traditional accounts and so no better at dealing with the volatility and uncertainty with attends intangible assets.