

## A thinkers' guide

The Internet may have been overhyped by the markets, but it will also make most businesses more efficient. Its impact on economic growth is less obvious, but could be equally dramatic

IT IS supposed to reduce distances and bring people closer. Yet the Internet seems to have the opposite effect on economists. The profession is divided on the effects of the Internet. Some predict that it will hugely boost global growth and kill inflation -- hence the boom in technology shares. Others retort that inflation is determined solely by the money supply, and that Internet share prices are overvalued. On this basis, when the bubble bursts, it will leave behind little more economic benefit than did the 17th century's tulip bubble.

Recent gyrations in the stockmarket might seem to support this second view. Many dot.com shares, particularly those of Internet retailers, have fallen off a cliff; some once-bright prospects are finding it hard to raise enough cash to stay in business. Yet the really big impact of the Internet is likely to be felt not among dot.com firms, but in the wider economy. And in this area, the truth probably lies between the economists' two extremes. The Internet will boost efficiency and growth, but not enough to justify current stockmarket valuations. Faster economic growth will not automatically mean faster profit growth, because margins may well be squeezed. As with most technological revolutions, the biggest benefits of the Internet will flow to consumers and not, in the end, to producers.

In practice, the Internet cannot easily be separated from information technology (computers, software and telecoms) in general. In America, the European Union and Japan, business spending on IT is growing at an average annual rate of 12%, much faster than overall investment. This promises additional productivity gains. This article will, however, focus on what is special about the Internet itself, and how it may deliver benefits above those from IT generally.

The economic impact of the Internet has often been described as an oil shock in reverse. The jump in the oil price in the 1970s increased inflation and pushed the world into recession. The Internet reduces the cost of another input, information, and so has positive economic effects.

The best way to look at this notion is to use a standard economic model of demand and supply (see left-hand). The economy is in equilibrium at the point where the aggregate demand curve  $D1$  and the aggregate supply curve  $S1$  intersect, at price  $P1$  and real output  $Q1$ . The Internet pushes the aggregate supply curve (an economy's productive potential) to the right, to  $S2$ . There is nothing new about this: innovations such as railways or electricity have always been the main source of long-term growth. If the demand curve remains fixed (an assumption we re-examine later), the price level falls to  $P2$  and output rises to  $Q2$ .

### The nude economy

Economists at Warburg Dillon Read, an investment bank, suggest that the new economy should be called the "nude economy" because the Internet makes it more transparent and exposed. The Internet makes it easier for buyers and sellers to compare prices. It cuts out the middlemen between firms and customers. It reduces transaction costs. And it reduces barriers to entry.

This last point may surprise dot.com firms that reckon the huge marketing and technical costs of setting up a business, and the supposed advantage that comes with being a first mover, constitute big barriers to entry. In practice, it remains to be seen how big such barriers are: some established dot.com firms have lost market share. But the real point is that the Internet is reducing barriers to entry in other parts of the economy.

To understand this, go back to Ronald Coase, an economist, who argued in 1937 that the main reason why firms exist (as opposed to individuals acting as buyers and sellers at every stage of production) is to minimise transaction costs. Since the Internet reduces such costs, it also reduces

the optimal size of firms. Small firms can buy in services from outside more cheaply. Thus, in overall terms, barriers to entry will fall.

In all these ways, then, the Internet cuts costs, increases competition and improves the functioning of the price mechanism. It thus moves the economy closer to the textbook model of perfect competition, which assumes abundant information, zero transaction costs and no barriers to entry. The Internet makes this assumption less far-fetched. By improving the flow of information between buyers and sellers, it makes markets more efficient, and so ensures that resources are allocated to their most productive use. The most important effect of the "new" economy, indeed, may be to make the "old" economy more efficient.

Economies will still be some way from the frictionless world of perfect competition. In some industries, low marginal costs (eg, the extra cost of selling software over the Internet is close to zero) and network effects (eg, the more widely an operating system is used, the more people will want to use it) will result in increasing returns to scale, and thus the emergence of monopolies. But because the Internet will in general reduce barriers to entry, making markets more contestable, competition and efficiency are still likely to increase across the economy as a whole.

It is hard to test this conclusion, but some studies seem to support it. Prices of goods bought online, such as books and CDs, are, on average, about 10% cheaper (after including taxes and delivery) than in conventional shops, though the non-existent profits of many electronic retailers make this evidence inconclusive. Competition from the Internet is also forcing traditional retailers to reduce prices. The Internet offers even clearer savings in services such as banking. According to Lehman Brothers, a transfer between bank accounts costs \$1.27 if done by a bank teller, 27 cents via a cash machine, and only one cent over the Internet.

Internet retailers and other business-to-consumer firms, such as Amazon or eBay, tend to hog the headlines, but the biggest economic impact of the Internet is likely to come from business-to-business (B2B) e-commerce. GartnerGroup forecasts that global B2B turnover could reach \$4 trillion in America in 2003, compared with less than \$400 billion of online sales to consumers.

B2B e-commerce cuts companies' costs in three ways. First, it reduces procurement costs, making it easier to find the cheapest supplier and cutting the cost of processing transactions. Second, it allows better supply-chain management. And third, it makes possible tighter inventory control, so that firms can reduce their stocks or even eliminate them. Through these three channels B2B e-commerce reduces firms' production costs, by increasing efficiency or by squeezing suppliers' profit margins. In the economic jargon, the economy's aggregate supply curve shifts to the right.

## **2B or not 2B?**

The biggest savings are likely to come in procurement. A recent report by Martin Brookes and Zaki Wahhaj, at Goldman Sachs, estimates that firms' possible savings from purchasing over the Internet vary from 2% in the coal industry to up to 40% in electronic components. British Telecom claims that procuring goods and services online will reduce the average cost of processing a transaction by 90% and reduce the direct costs of goods and services it purchases by 11%. B2B exchanges also offer big savings: Ford, GM and DaimlerChrysler are setting up a joint exchange to buy components from suppliers over the Internet, and this week the biggest aerospace firms said they would follow suit.

Messrs Brookes and Wahhaj reckon that doing business with suppliers online could reduce the cost of making a car, for instance, by as much as 14%. Their report looks at industries that account for about one-quarter of America's GDP, and uses input-output accounts to include second-round effects of cost savings -- ie, that lower costs in one industry will reduce the price of inputs for other industries. They conclude that, in the five big rich economies, B2B e-commerce could reduce average prices across the economy by almost 4%. And this probably understates likely cost savings because it is based on lower procurement costs alone.

What does all this mean for inflation and growth? As lower costs encourage firms to produce more at any given price (ie, the supply curve shifts from S1 to S2 in the ), the long-term equilibrium level of output will rise and the price level will fall. But note that it is the level of prices and not the level of inflation that falls. To the extent that this happens gradually over a period, inflation may be reduced, but only until prices reach their new, lower equilibrium level.

The Internet cannot permanently reduce inflation, because this is a monetary phenomenon. If central banks continue to aim for the same inflation target as before, then, beyond the short term, inflation will stay unchanged. If inflation drops below target because the Internet pushes prices down, the central bank will reduce interest rates, allowing faster growth while leaving inflation unchanged. Prices of goods exposed to the Internet may fall, but prices of other goods and services will rise faster than before.

By boosting productivity, the Internet can lift the economy's safe speed limit before inflation starts to rise. But how much? The Goldman Sachs study, the most comprehensive to date, estimates that B2B e-commerce will cause a permanent increase in the level of output by an average of 5% in the rich economies, with over half of this increase coming through within ten years. That implies an increase in GDP growth of 0.25% a year. If the benefits of Internet use spread to other industries not included in the study, the eventual gains would be larger.

In historical terms, an extra 0.25-0.5% of annual growth would be hugely significant. Estimates suggest that the carriage of freight by rail over a couple of decades in the late 19th century added perhaps 10% overall to American output. But if the Internet by itself seems unlikely to boost economic efficiency by as much as this, the productivity gains from information technology and the Internet together could easily come close. Computers, software and telecoms now account for about 12% of America's total capital stock, not far short of the share accounted for by railways at the peak of America's railway age in the late 19th century.

Moreover, information technology has some advantages over previous technological revolutions. First, unlike the railways, which affected only the movement of goods, it can be applied across a broader section of the economy, including services. The Internet, for example, offers a new information system, a new marketplace, a new form of communication and a new means of distribution. The power of digital distribution may even lead to wholly new products and services that nobody has hitherto imagined, offering the hope of further increases in economic growth.

A second positive factor is that the prices of computers and telecommunications have fallen more rapidly than for any previous technology. This is encouraging firms to adopt the Internet more quickly. There is always a lag before new technology lifts productivity growth, because it takes time for firms to reorganise their business to take advantage of new ways of doing things. The recent spurt in American productivity may be the productivity pay-off from the computer revolution, which started 50 years ago with the invention of the transistor. But because the Internet is now spreading extremely rapidly, productivity gains linked to it could arrive pretty quickly.

## **Inflation and profits**

So far this article has argued that the Internet may push down inflation in the short run, and that in the longer run it will boost growth. However, this assumes that the Internet affects only aggregate supply. In reality, it could also boost demand. If equity investors expect faster growth in output and profits and so push up share prices, this will boost households' wealth and encourage them to spend more, even before the increase in supply has materialised. Higher share prices, and hence a cheaper cost of capital, may also boost investment. As a result, the demand curve may shift to the right, to D2 (see right-hand ).

This may describe the situation in America today. Alan Greenspan, the Federal Reserve chairman, recently argued that an increase in productivity growth could indeed boost demand via share prices. The risk is that, if this increase in demand outstrips the productivity-led boost to supply, the equilibrium price level, and so inflationary pressure, could rise in the short term, not fall.

Some economists even argue that, following a technological shock, the previous inflation target is no longer appropriate. An essay in the 1999 annual report of the Federal Reserve Bank of Cleveland suggests that if rapid productivity gains pull down the costs of production, prices should also be allowed to fall, so workers can enjoy the benefits of higher productivity through increases in real wages. If central banks stop prices falling, and nominal wages, being stickier than prices, lag behind productivity gains, this will inflate profits and share prices will soar on the (false) expectation that profits will go on rising, spurring excessive investment. This suggests that central banks should aim for lower inflation targets than before.

Investors certainly seem to have inflated expectations about future profits. But faster growth and lower costs do not automatically justify a leap in share prices. Yes, there will be big cost savings, but to the extent that the Internet lowers barriers to entry and increases competition, this is likely to squeeze profit margins, so passing the benefits on to consumers. History shows that, although the share of profits often rises during the early years of technology-led expansions, as it did in the 1990s, it then usually declines as a result of competition from new entrants attracted by high returns.

Consider again the example of railways in the 19th century. Most schemes made little money and many went bust, largely because overinvestment had created excess capacity and fierce competition. Britain's railway mania of the 1840s certainly had much in common with Internet fever. Share prices soared, then spectacularly tumbled as many lines failed to deliver expected profits.

There is a big risk with the Internet, similarly, that boom will be followed by bust. But the good news is that, long after share prices crashed, railways continued to function, to the benefit of the economy, if not to the original investors. In all technological revolutions, from the railways to the Internet, the only sure long-term winners are consumers who gain from lower prices and hence higher real wages. There is no reason to expect the Internet to be any different.

Indeed, by reducing search costs and increasing the flow of information, the Internet explicitly shifts power from producers to consumers and so looks even more likely to squeeze profits. As with railways, stockmarkets currently seem to think that Internet firms will be the ones that reap the biggest rewards. But consumers and old-economy firms, from cars to chemicals, that use B2B e-commerce to reorganise themselves are likely to gain most. The overall rate of profits may be little changed, but profits will be redistributed.

### **Catchup.com**

It is often argued that America's lead in the Internet age will give it an economic edge for many years to come. After all, corporate spending on IT is considerably higher as a share of GDP in America than in Japan or the EU, and the proportion of households with Internet access is three times as high. Some economists also reckon that the success of America in exploiting IT partly reflects its flexible, competitive markets. The Internet may yield smaller benefits in more tightly regulated economies with rigid labour and product markets and inefficient capital markets, which prevent labour and capital shifting in response to new opportunities.

To turn this argument round, however, the potential for cost savings and productivity gains from the Internet should be much bigger in the EU and Japan than in America. The impact of the Internet on growth could thus also be more powerful in Japan and Europe than in America. This is because the Internet, by increasing price transparency and competition, will directly attack the inefficiencies in their economies.

Countries with high distribution margins are likely to see the biggest price reductions and the biggest gains in efficiency. By exposing firms to more intense global competition, the Internet should force governments and businesses to rethink their old, inefficient habits and seek new ways to get around or eliminate market rigidities.

In Japan the Internet strikes right at the heart of many archaic business practices that hold prices high and hinder productivity. Take Japan's famously inefficient and expensive distribution system. Suppliers and retailers tend to be tied to manufacturers, through cross-shareholdings. This allows manufacturers to control prices by restricting distribution to their own retailers. However, by increasing price transparency, the Internet will give more power to consumers. Japan often seems to be a nation of middlemen. The longer the supply chain, the bigger the potential gains from B2B e-commerce, since it allows firms to eliminate the many layers of middlemen that hamper economic efficiency. Structural failings in Japan may hinder productivity gains from the Internet at first -- but they cannot block them.

The Internet allows producers and consumers to seek the cheapest price in the global market. This will make it harder to maintain higher prices and higher taxes. In Europe especially, by making cross-border purchases easier, the Internet will increase tax competition and so put pressure on governments to reduce taxes.

The Internet could also give a boost to growth in emerging economies. Echoing Coase's theory, Andy Xie, an economist with Morgan Stanley in Hong Kong, argues that because the Internet cuts transaction costs and reduces economies of scale from vertical integration, it reduces the economically optimal size of firms. For example, lower transaction costs will make it possible for small firms in Asia to work together to develop a global reach. In this way, the web could open up more opportunities for emerging economies to catch up with richer ones.

Smaller firms in emerging economies can now sell into a global market. It is now easier, for instance, for a tailor in Shanghai to make a suit by hand for a lawyer in Boston, or a software designer in India to write a programme for a firm in California. One big advantage rich economies have, their closeness to wealthy consumers, will be eroded as transaction costs fall. Mr Xie argues that this will help emerging Asia to catch up.

The Internet could also accelerate the process of economic catch-up by speeding up the diffusion of information, which will help new technologies to reach emerging economies. The Internet is spreading rapidly throughout Asia, Latin America and Eastern Europe. In contrast, it took decades before many developing countries benefited from railways, telephones or electricity. If America can look forward to significant gains from IT and the Internet, then the rewards to other economies could be even bigger.

