
What's the 'New Economy'? And has it crossed the Pacific to New Zealand?

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The objectives of this article are twofold. The first is to examine explanations for the recent performance of the United States economy. We examine both 'New Economy' and other more conventional explanations. The second objective is to see whether 'New Economy' factors have had an impact on the New Zealand economy.

"When the facts are unclear, I keep an open mind." John Maynard Keynes.

1 Introduction

The United States economy is currently experiencing the longest expansion in its economic history. Its performance since the second half of the 1990s has been particularly remarkable. Rapid output growth and increased labour productivity have been accompanied by declines in both the unemployment rate *and* inflation. Over the 1990s, New Zealand also experienced an increase in its rate of economic growth and a decline in unemployment and the rate of inflation. However, New Zealand's labour productivity performance, although improving over the 1990s, has been disappointing relative to the United States'. In this article we review the experience of the United States and New Zealand and offer some explanations for their respective performances.

There are several possible explanations for the 'strong growth low inflation' outcomes in the United States. These are discussed, in turn, in section two of this article. One possibility, the 'New Economy' explanation, is that the strong output growth is the result of productivity gains from the implementation of information technology (IT) and the internet. An increase in productivity growth boosts the growth rate of potential output and implies that an economy can grow faster without generating inflation. Improvements in monetary and fiscal policies and increased globalisation are also likely to have contributed to the US macroeconomic performance. Alternatively, it is possible that the US economy has been growing at an unsustainable rate, but that inflation pressures have remained subdued for other reasons.

Section three examines the New Zealand experience. Better monetary and fiscal policies and globalisation have also been important factors in New Zealand. We look at available data to see if there is any evidence that New Zealand's macroeconomic performance has also been affected by the 'New Economy' phenomenon.

Section four summarises the article and offers some concluding remarks. To foreshadow the conclusions, information technology and the internet provide one potentially important explanation for the productivity gains, strong output growth and low inflation in the United States. However, there are other explanations for the recent performance of the US economy whose importance cannot be discounted. Moreover, the nature of the contribution that New Economy technologies have made may relate more closely to the production of computer technology than to its use. While the information technology sector in New Zealand continues to grow, and the uptake of new technologies and the internet becomes more widespread, offering the prospect that New Zealand will see gains in productivity similar to those in the United States, there are good reasons to temper our optimism.

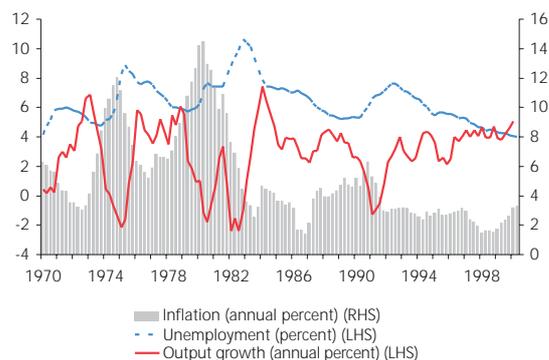
2 The US experience

Since the end of the last recession in the United States, US real gross domestic product (GDP) has grown at an average year-on-year rate of about 3.5 percent and the unemployment rate has fallen from above 7 percent to around 4 percent (the lowest level since 1970q1). Notwithstanding strong output and employment growth, inflation measured by the consumer price index (CPI) has, on average, been below 3 percent (see figure 1).

¹ The authors would like to thank Reserve Bank colleagues for comments on earlier drafts of this article. Special thanks are due to David Archer and Geof Mortlock, and to Louise Rockliff for preparing the graphs.

In this section, we discuss possible explanations for this strong growth and low inflation outcome. Elements from both New Economy arguments and more conventional explanations are likely to have contributed to the US economic performance and it is difficult to determine how much weight to attribute to each one.

Figure 1
Output growth, unemployment and inflation in the United States



Source: <http://www.stls.frb.org/fred/index.html>

The New Economy explanation of the US economic performance

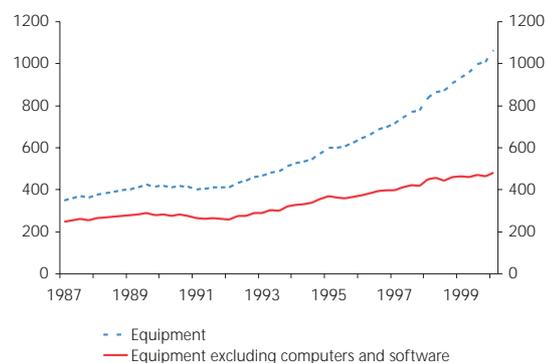
New Economy theories argue that the recent performance of the US economy reflects a new era of intense competition and high productivity growth. The thrust of New Economy explanations is that technological innovations have changed business practices, provided opportunities for extensive productivity gains, and strengthened competitive pressures, thereby exerting a downward influence on prices. These structural changes and technological innovations largely derive from the implementation of information technology and the internet (where we use 'internet' to refer to communication technologies more generally).²

In various ways, investment in information technology and the internet can contribute to an economy's productive capacity. In turn, an increase in productive capacity enables more goods and services to be produced (and consumed) without generating upward pressure on prices. Investment

² Sectors that are most affected by information technology innovations include telecommunications, computer systems, broadcasting and publishing, financial services, distribution and transportation, health care, advertising and leisure.

in information technology equipment and software has grown rapidly in the United States, particularly during the latter half of the 1990s. Total real investment in equipment has trended upward since at least the mid-1980s and, as we can see from figure 2, information technology and software have become an increasingly large component of this investment.³

Figure 2
Real investment in the United States
(1996 chain-weighted US dollar billion)



Source: Bureau of Economic Analysis

The internet

The internet features prominently in many explanations of the US growth phenomenon. There are a number of reasons why the internet and IT may lead to lower costs and productivity improvements. The internet is likely to play an important role in strengthening competition, both domestic and global, by broadening the array of buyers and sellers that can be matched with one another. Increased competition also provides a strong incentive to invest in new technologies, in an effort to maintain a competitive advantage (against both domestic competitors and 'cheap foreign producers'), and as a tool to gain market share in domestic and foreign markets.⁴

³ Part of the IT equipment has been imported and, as a result, capital imports have also increased. This increase in capital imports contributed to a widening of the current account deficit in the United States. The sharp deterioration in the US current account during the 1990s thus was not solely the result of strong US demand relative to the rest of the world, but also reflects, at least in part, investment in New Economy equipment, with its attendant implications for productive capacity.

⁴ For example, KPMG New Zealand was quoted as saying that "banks were scrambling to introduce Internet facilities mainly... to ensure they were not left behind" (The Dominion 2000).

The internet acts as a repository for information and is a medium for accessing this information. It enables businesses and consumers to communicate at lower cost and has the potential to alter radically the way in which people communicate and hence the way in which they transact business – affecting both business to consumer (B2C) and business to business (B2B) transactions.

The internet also provides search engines that can be used to discriminate between useful information and irrelevant material. Because the internet reduces the cost of search, consumers and firms are more likely to find suppliers that best meet their needs. In particular, they are more likely to find the supplier with the lowest price. The internet, by reducing search costs, should cause prices to converge towards the lowest price in the market, since divergent, higher prices will yield little in the way of demand.⁵

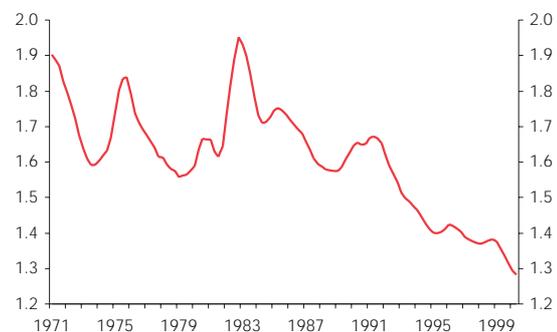
Traditional intermediation is also likely to be rationalised and made cheaper by the internet. For example, the role of real estate agents is to match buyers and sellers of houses. Real estate agents currently exist in part because of imperfect information between buyers and sellers and because of high search costs that are involved with finding the right house. The internet and the search engines available on the internet have the potential to reduce search and transaction costs by making information readily available and accessible, reducing the need for intermediaries.

Companies producing computer systems have also been profoundly affected by the development of the internet. Many computer systems companies now assemble computers to order, dealing directly with consumers and component manufacturers, and eliminating retailers. A traditional model for computer sales would involve a company making computer parts, assembling them, and then selling them to a retailer, who would then market and sell them to consumers.

A different approach is to let consumers specify the computer configurations that they wish to purchase. The computers are then made to order and are shipped off directly to consumers. By manufacturing to meet exact needs, costs

associated with holding stocks of unwanted computers, ie computers with the incorrect combination of attributes, can be eliminated. This is one example of where developments in IT and the use of the internet have enabled improved inventory management.⁶ These improvements are also evident in macroeconomic data. The stock to sales ratio in figure 3 shows that inventories have trended downwards in the United States, particularly during the 1990s.

Figure 3
Ratio of inventories to sales in the United States



Source: *Datastream*

How important is the internet for the US economy?

Analysis by Forrester Research suggests that in 1999 e-commerce in the United States was worth about US\$120 billion.⁷ As a point of comparison, US (nominal) gross domestic product (GDP) in 1999 was about US\$9,250 billion. The e-commerce number should probably be regarded as the tip of the New Economy iceberg, since associated transactions (such as the provision of internet services, investment in infrastructure, research and so on) potentially contribute a great deal more.

The internet and its associated activities are expected to become more and more important. Forrester Research, for example, projects that e-commerce transactions will increase ten-fold in about four years and GartnerGroup predicts that

⁵ A recent Warburg Dillon Read study illustrates some of the downward price pressures caused by the internet more generally. See Cates and Kemmsies (2000).

⁶ Earlier distribution networks through 0800 numbers also reflect developments in communications and information technology. The use of the internet reflects an evolution in these methods.

⁷ Forrester Research can be found at www.forrester.com.

B2B e-commerce in the Asia-Pacific region will increase slightly more than one hundred-fold in five years.⁸

Anecdotes abound regarding the impact of the internet. In the automobile industry, for example, Ford, General Motors and Volkswagen recently announced that they are going to move their B2B transactions to the internet, developing systems that can be used by suppliers along the distribution chain. Some car manufacturers have also started re-purchasing retail franchises in order to take control of that aspect of distribution (and to avoid liability claims that might arise from selling vehicles over the internet). Interestingly, Volkswagen expects most of the gains to come from reductions in inventories.

Productivity

The internet and information technology provide opportunities for productivity gains. Labour productivity growth, measured by output per hours worked, has been strong in the United States over the latter half of the 1990s (see figure 4). The increase in labour productivity growth has been particularly evident in manufacturing output per hour.

Figure 4
Labour productivity growth in the United States
(annual percent)



Source: Bureau of Labor Statistics

Part of the improvement in labour productivity growth reflects an increase in capital per worker. Total factor productivity (TFP) is, at least conceptually, a better measure of productivity

because it takes into account changes in other inputs, eg capital. However, TFP is harder to measure than labour productivity because of the difficulties, for example, of aggregating capital at various stages of their life cycles into a single meaningful measure.

Figure 5 plots TFP growth in the United States for the manufacturing and the private business sectors. There is less evidence of a significant increase in TFP growth and the performance of the manufacturing sector has been more or less comparable to that of the private business sector. Nevertheless, TFP growth has accelerated somewhat over the latter half of the 1990s, providing some evidence that it is not simply the addition of more capital equipment that has been driving the increase in labour productivity.

Figure 5
US total factor productivity (TFP) growth
(annual percent)



Source: Bureau of Labor Statistics

There is some dispute regarding the recent gains in productivity in the United States. Investment in computers and other information technology equipment has increased since at least the 1980s, but it is only recently that the adoption of new technologies appears to have resulted in any sustained gains in productivity. The early stages of the economic expansion in the 1990s were actually characterised by very slow productivity growth by historical standards.

Productivity growth may be slow initially when a new technology is first introduced, reflecting, for instance, the time it takes firms to change over to new systems. Once this transition phase is complete, growth may then pick up quite sharply, eg because of learning by doing or because of

⁸ See <http://gartner4.gartnerweb.com/public/static/aboutgg/pressrel/pr021700.html>.

more widespread adoption of the technology. The recent improvements in productivity might therefore reflect, at least in part, the maturation of earlier investment in computing hardware and software.

It is not clear how widespread recent productivity gains are across the US economy. Robert Gordon, a well-known expert on the topic of productivity, finds that the acceleration in productivity growth since the mid-1990s did not occur across the US economy as a whole. Instead, it has been concentrated in computer manufacturing, a very small part of the US economy, and productivity in the rest of the economy may actually have fallen.⁹

A recent study by Stephen Oliner and Daniel Sichel at the Board of Governors of the Federal Reserve also finds that technical advances in the *production* of computers contributed to the speed-up in productivity growth.¹⁰ However, unlike Gordon, their results also show that the *use* of information technology has made an important contribution to productivity growth.

The widespread productivity gains reported by Oliner and Sichel contrast with Gordon's finding that the improvements in productivity growth are concentrated in computer manufacturing. The difference in results arises because Oliner and Sichel assess unadjusted data, without attempting to divide productivity growth into its trend and cyclical components.

Labour productivity growth in the United States has undeniably increased of late.¹¹ However, it is unclear how much of these gains are due to a shift in long-run trend productivity growth and the growth of potential output. Productivity growth during 1995-99 was about 1.4 percent per annum higher than it was over the 1972-95 period. In another recent paper Gordon finds that about 40 percent of the 1.4 percentage point increase can be attributed to

unsustainable cyclical effects and that 60 percent is due to an acceleration in trend growth.¹²

Conventional explanations of the US performance

Information technology, the internet and the productivity gains and competition benefits therefrom are one possible explanation for the combination of strong output growth *and* low rates of inflation in the United States. However, other factors, notably better monetary and fiscal policies, are also likely to have contributed to the US economy's macroeconomic performance. In addition, temporary factors have helped to moderate inflation outcomes. However, these factors are likely to dissipate (if they have not done so already). In this section we discuss these more conventional explanations for the US performance.

Improvements in policy

More stable monetary and fiscal policies are likely to have contributed to the robust economic growth and low inflation in the United States over the last two decades. Economies work more efficiently in an environment where price signals are clear, and the best contribution monetary policy can make to maximising sustainable economic growth is to maintain price stability. The Federal Reserve, by keeping inflation low and broadly stable, has reduced inflation and output growth volatility, assisting to make recessions less frequent, less severe and shorter. Moreover, the low and stable level of inflation enabled the Federal Reserve to maintain or even reduce interest rates. Lower (real) interest rates, compared to earlier years, have stimulated aggregate demand and economic growth.

On the fiscal front, policy has also become more focused on the medium term. For the last three presidential terms, the US Congress and White House have been split across party lines. This division has constrained discretionary fiscal expenditures, reducing expansionary fiscal impulses. The restraint has also been driven by political pressure to balance the budget. The recent emphasis on fiscal responsibility has helped diminish the boom-bust cycle, eased pressures on interest rates, and contributed to the decline in

⁹ See Gordon (1999).

¹⁰ See Oliner and Sichel (2000).

¹¹ Some improvement in the productivity numbers are due to better measurement of inflation, as the Bureau of Labor Statistics has changed its methods for measuring inflation to try to correct for the upward bias in the consumer price index. A lower deflator for nominal output increases real output and thus raises real output per hours worked. These revisions may have increased measured productivity by as much as 0.4 percentage points a year (Gordon 1999).

¹² See Gordon (2000).

macroeconomic variability and improvements in economic performance.

Some of the improvement in output growth and reduction in inflation is also likely to be a pay-off from the microeconomic reforms of the late 1970s and 1980s, instituted to improve competitiveness by reducing the extent of regulatory impediments in specific markets. For example, the deregulation of the airline industry in 1978, and trucking and railroads in 1980, was followed by significant price declines in these industries.

Globalisation

Increased global competition has also put downward pressure on prices. Despite the lack of progress at the recent World Trade Organisation meeting in Seattle, the overall trend, for the last several decades, has been towards increased globalisation. Regulatory barriers have decreased and economies have become more open and more integrated. As a result, world trade has increased, rising much faster than world output. For example, over the period 1972-98, total OECD real exports grew, on average, at around 6.5 percent per annum compared with around 2 percent per annum for total OECD output.¹³

Reductions in trade barriers generally make it more difficult for firms to raise prices without losing market share. The North Atlantic Free Trade Agreement (NAFTA), for example, makes it more difficult for firms in the United States to increase prices as there is always the threat that production will move to lower cost locations in Mexico.

The entry of China and parts of the former Soviet bloc into world markets, and the increased technical expertise of emerging economies have all greatly expanded the pool of potential competitors faced by US (and other) firms.

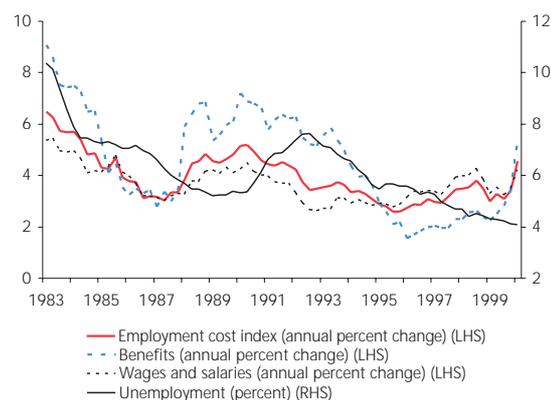
Employee costs

One of the most commonly cited 'temporary' factors that has moderated US inflation in the face of strong economic growth is the benefits component of workers' compensation. The rate of increase of workers' compensation, as measured by the employment cost index (ECI), actually declined over

¹³ See Organisation for Economic Co-operation and Development (1999).

the first half of the 1990s and then levelled off over the second half, despite a falling unemployment rate (see figure 6). Although the wage and salary component of the ECI edged up slightly, this was offset by slower growth in benefits costs, largely due to falling medical benefits.¹⁴

Figure 6
The employment cost index and US unemployment



Source: Datastream

Interestingly, workers did not respond to the reduction in benefits by demanding higher wages. One (often cited) explanation is that increased job uncertainty – due to global competition and the threat that jobs might be lost to other countries – discouraged workers from making such demands. The increased use of temporary workers is likely to have contributed to labour market insecurity, further weakening the bargaining power of workers.¹⁵ Naturally, the importance of such concerns diminishes as the unemployment rate falls.

In addition, the increasing use of equity returns as a source of remuneration (eg via options and shares) may have changed the demand for benefits. For instance, the capital gains associated with stock options probably reduced the demand for other forms of compensation. Furthermore, a rising stock market significantly reduced the size of employer contributions to retirement schemes.¹⁶

¹⁴ The reduction in medical benefits growth resulted from extensive restructuring in the health care industry (eg the introduction of Health Management Organisations, HMOs).

¹⁵ Unionisation has also declined in the United States.

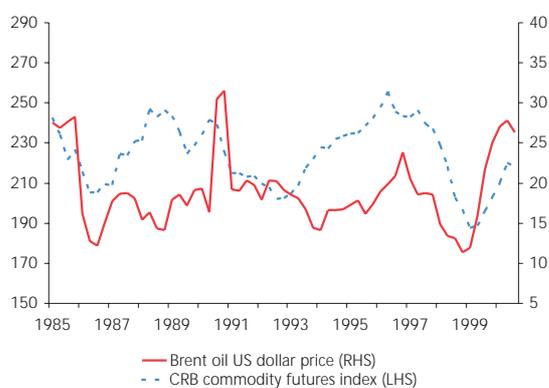
¹⁶ If equity returns are indeed an important source of remuneration, then a decline in stock prices would place stronger upward pressure on wages.

Global financial crisis

Weakness in world demand is another commonly-cited temporary factor that put downward pressure on prices in the United States at a crucial time during the 1990s. The economies of Asia were particularly affected by the financial crisis in 1997-98; currency devaluations and financial crises were followed by deep recessions. The decline in demand in Asian countries exerted downward pressure on the prices of many goods that are traded globally, at a time when one might have expected the stresses of rapid growth to put pressure on US inflation. Commodity prices were particularly affected: oil prices plummeted (see figure 7), and the price of many agricultural products and metals also fell sharply. A strong US dollar, in part due to a 'flight to quality', put additional downward pressure on the price of US imports.

However, the favourable effects of some of these factors on inflation have largely dissipated. For example, commodity prices have recovered from their trough and the price of oil has increased substantially.

Figure 7
Commodity prices and the price of oil



Source: Datastream

Productivity gains from technological innovations, improved macroeconomic policies and globalisation are *all* important explanations for the remarkable performance of the US economy. For US policymakers the principal concern is whether recent increases in output reflect long-lasting increases in productive capacity *or* unsustainable excess demand. If inflation pressures increase in the US economy then the temporary factors that have moderated inflation may have been more important than previously thought. Until the US economy has gone through a full business cycle,

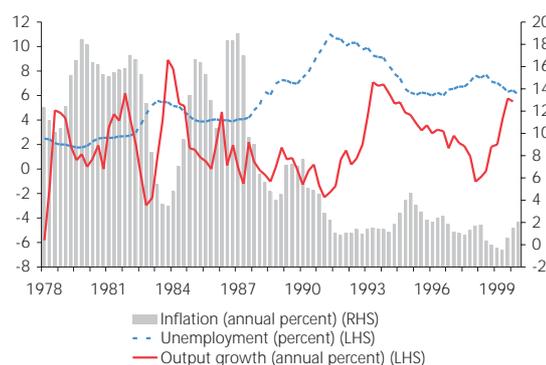
or indeed several, it will be difficult to disentangle the relative importance of the factors that are currently affecting the US economy.

3 New Zealand

In parallel with the US experience, output growth has been quite healthy and unemployment has trended downward in New Zealand over much of the 1990s. Since the end of the recession in the early 1990s, real output grew at an average year-on-year rate of about 3.0 percent and the unemployment rate fell from above 10 percent to around 6 percent. Notwithstanding strong output and employment growth, consumer price inflation has, on average, been below 2 percent (see figure 8). Moreover, the expansion from 1992q3 to 1997q4 was the most enduring and consistent of those that occurred during the last three decades (see figure 9).

In this section we look at some of the data available for New Zealand to see whether there is any evidence that New Zealand may also be affected by the New Economy phenomenon, but first we consider some more conventional explanations.

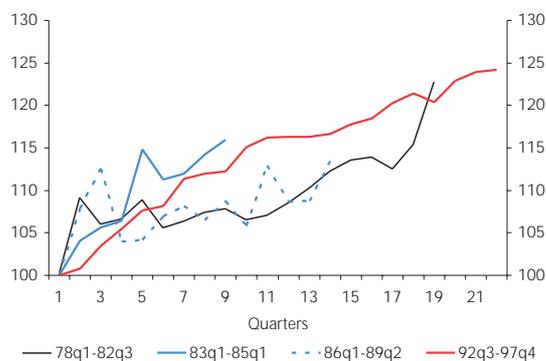
Figure 8
Output growth, unemployment and inflation in New Zealand



Source: Statistics New Zealand and Reserve Bank of New Zealand

Figure 9
New Zealand's last four expansions¹⁷

(index)



Source: Statistics New Zealand and Reserve Bank of New Zealand

Conventional explanations of New Zealand's economic performance

As in the United States, greater macroeconomic stability, in part due to more medium-term focused monetary and fiscal policies and the microeconomic reforms of the 1980s and early 1990s, are likely to have contributed to the improvement in New Zealand's economic performance. Moreover, increased global competition has put downward pressure on prices.

Improvements in policy

Real output growth and inflation volatility in New Zealand have declined in recent years, contributing to improved economic performance over the 1990s (see figure 10).¹⁸ As in the United States, better monetary and fiscal policies are one possible reason for the reduction in macroeconomic variability. Price stability as the sole objective of monetary policy was formally adopted with the enactment of the Reserve Bank of New Zealand Act (1989) and responsible fiscal management was formalised with the introduction of the Fiscal Responsibility Act (1994). These policy structures have contributed to the efficient functioning of markets and economic growth.

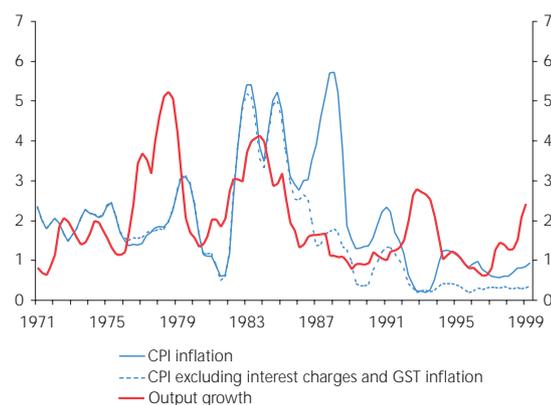
¹⁷ The first quarter of the expansion equals 100.

¹⁸ Figure 10 depicts the standard deviation of nine-quarter rolling samples (each sample centred on the middle quarter). The most recent blip in real GDP volatility results from the negative growth rates (and hence large swings in GDP growth) in the first half of 1998.

Microeconomic and industry-specific reforms are also likely to have been an important factor in the improved macroeconomic performance. For example, following the deregulation of the transport sector, the real price of road transport services fell by about 14 percent between 1984 and 1994, helping bring down inflation from double-digit numbers throughout most of the 1970s and much of the 1980s.¹⁹ Reduced costs also helped the competitiveness of exporters. Moreover, industry deregulation and the elimination of regulatory distortions to prices contributed to an improved price signalling mechanism. The passage of the Employment Contracts Act (1991) facilitated greater wage and labour force flexibility.

Figure 10
Inflation and output volatility in New Zealand

(annual percent)



Source: Statistics New Zealand and Reserve Bank of New Zealand

Globalisation

Increased global competition has also put downward pressure on prices in New Zealand. The economic reforms of the 1980s and early 1990s transformed New Zealand from one of the most regulated economies in the OECD to one of the most open and market-based. For example, the nominal rate of protection has been reduced from an average of around 30 percent in 1984 to around 5 percent currently.²⁰

¹⁹ See Buckle (2000).

²⁰ See New Zealand Institute of Economic Research (1999). The nominal rate of protection is a measure of how much policies raise domestic prices above import prices.

Greater exposure to international competition has made it more difficult for firms to raise prices without losing market share, and domestic capacity constraints have become relatively less important. Moreover, the reduction of trade barriers has obliged companies to invest in cost-reducing and productivity-enhancing facilities to improve their competitiveness.

Factors such as parallel importing have also reduced inflationary pressures. All else equal, parallel importing is likely to reduce future inflation pressures, by decreasing the market power of individual suppliers. These competitive pressures help maintain inflation at low levels.

What about New Economy explanations?

Better fiscal and monetary policy and increased globalisation are important factors in explaining the improved output growth and low inflation outcomes since the end of the recession in the early 1990s. In this section we look at some of the data available for New Zealand to see if there is any evidence that New Zealand's macroeconomic performance may also have been affected by the New Economy phenomenon.

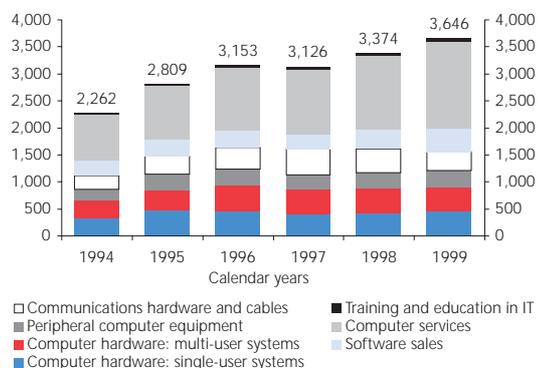
Information technology

Although we typically think of New Zealand as a low-tech, commodity-oriented economy, which of course it largely (still) is, the technology sector is expanding and becoming increasingly important. For instance, the value of economic activity associated with information technology (excluding telecommunications) increased by more than 60 percent over the five years from 1994 to 1999 (see figure 11) and accounted for about 3.7 percent of GDP in 1999 – up from 2.8 percent in 1994.

Adding telecommunications to the New Zealand number raises the proportion from 3.7 percent to roughly 7.5 percent of GDP in 1999. This number is broadly comparable to estimates for the United States. The US Department of Commerce calculates that IT industries in the United States, including telecommunications, made up slightly more than 8 percent of US GDP in 1999.²¹

²¹ The US definition of telecommunications includes telephone and telegraph communications, radio and television broadcasting, cable and other pay TV services, as well as household audio and video equipment.

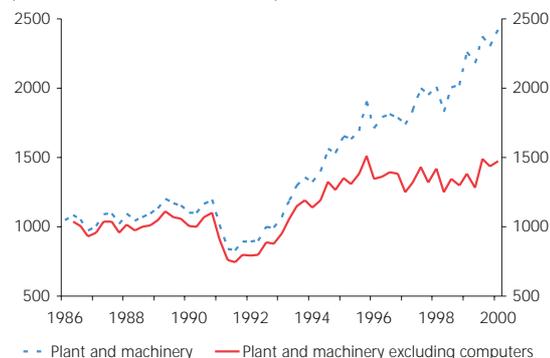
Figure 11
The NZ information technology market
(NZ dollar million)



Source: Statistics New Zealand

The use of computers and adoption of new information technologies have increased rapidly in New Zealand over recent years, particularly since the second half of the 1990s. These developments are also reflected in the composition of firms' real investment (see figure 12).²² IT- and non-IT-related investment by New Zealand firms and state owned enterprises grew at similar rates from the mid-1980s to the mid-1990s. However, in recent years, growth of investment in information processing equipment appears to have accelerated, with IT equipment currently making up around a third of investment in plant and machinery.²³

Figure 12
Investment in New Zealand
(1991/92 NZ dollar million)



Source: Statistics New Zealand

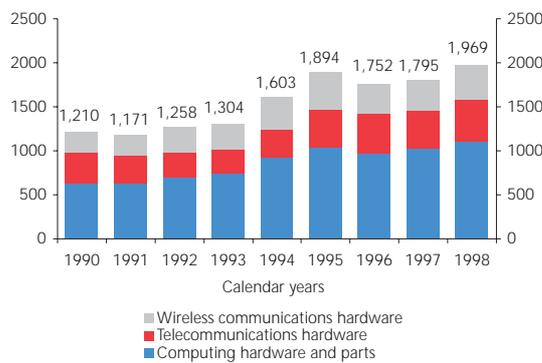
²² Statistics New Zealand uses a US wholesale price series to deflate the value of computers. The US series is obtained by hedonic regression methods, which are designed to take into account improvements in quality.

²³ These numbers should be regarded as indicative and could change with the introduction of chained-weighted GDP data at the end of the year.

Trade data confirm that New Economy technologies are becoming more important. Most of New Zealand's IT equipment is imported and capital imports, as a result, have risen strongly. For the nine years from 1990 to 1998, the New Zealand dollar value of IT hardware imports rose by over 60 percent (see figure 13).²⁴

Figure 13
New Zealand IT-related hardware imports

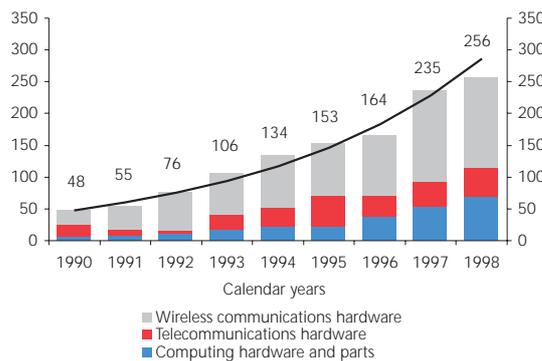
(NZ dollar million)



Source: March (1999)

Figure 14
New Zealand IT-related hardware exports

(NZ dollar million)



Source: March (1999)

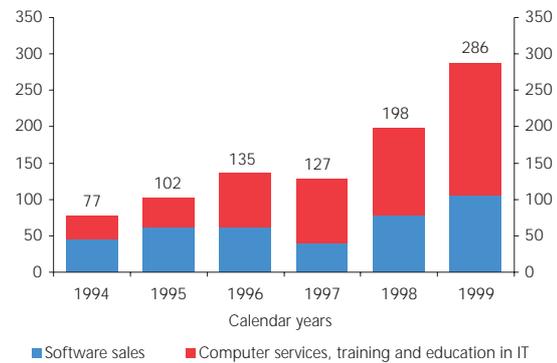
New Zealand's IT-related exports have also been growing dramatically over the 1990s – albeit from a low base. In 1998, IT hardware exports amounted to about 0.3 percent

²⁴ Part of the increase in capital imports has been financed by borrowing abroad and the deterioration in New Zealand's current account, to some extent, likely reflects investment in New Economy technology and thus future productive capacity.

of GDP, or 1.0 percent of total exports (see figure 14). Adding software exports increases the proportion of IT-related exports to about 0.5 percent of GDP and 1.7 percent of total exports (see figure 15). As a point of comparison, in 1998 exports of kiwifruit made up about 0.4 percent of GDP and 1.5 percent of total exports.

Figure 15
New Zealand exports of software and IT-related services

(NZ dollar million)



Source: March (1999)

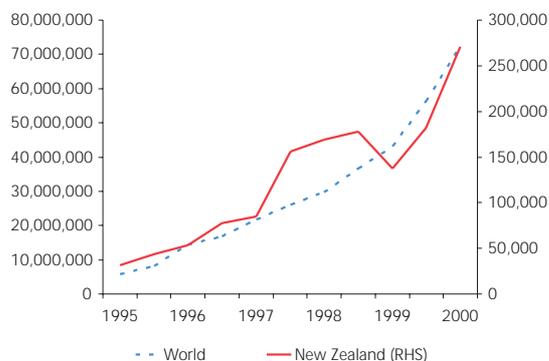
The internet

Internet access in New Zealand appears to have kept pace with other countries. Internet access can be measured by the number of 'internet hosts' – computers that are permanently attached to the internet. The number of internet hosts is a rough measure of the number of people with access to the internet and a measure of the amount of 'local' information available on the internet. The actual number of internet users will be higher than the number of hosts, because home or small business computers, which connect by dialling up to a service provider, are *not* counted as internet hosts.

Worldwide internet access has increased steadily since 1995 (see figure 16). The number of computers permanently attached to the internet in New Zealand has grown at roughly the same rate as in the rest of the world – around 60 percent per annum.²⁵

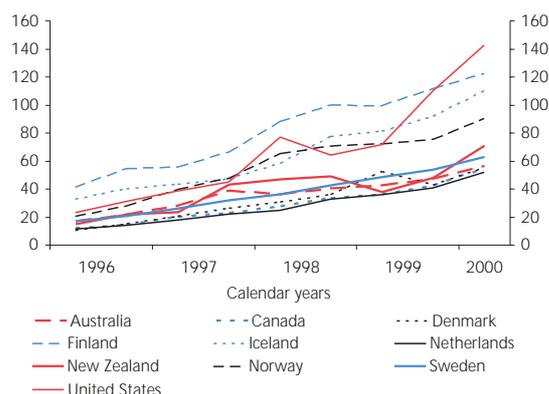
²⁵ The downward blip in the New Zealand series may reflect technical problems with data collection.

Figure 16
Number of internet hosts in New Zealand and the world



Source: *Internet Software Consortium (www.isc.org)*

Figure 17
Number of internet hosts per 1000 people – top ten countries with highest internet access²⁶



Source: *March (1999) and Internet Software Consortium (www.isc.org)*

Data on per capita internet connections also confirm that internet adoption in New Zealand is comparable to that in other developed countries. This is evident from figure 17, which shows the number of internet hosts per 1000 people for the ten countries with the highest per capita internet connections; New Zealand runs well in the middle of the developed country pack.

Country numbers of internet hosts per 1000 people (in figure 17) and the New Zealand numbers (in figure 16) should be treated as indicative. The numbers for the United States are

²⁶ Since 1998 the US observations have been proxied by assuming that three quarters of dot.com and dot.net sites are in the United States. The proportion is based on an OECD estimate.

likely to be biased upward, while the numbers for the other countries, including New Zealand, are likely to be higher than those reported here. This is because the numbers are based on country domain names. A New Zealand company, for example, that registers for a dot.com address as opposed to a dot.co.nz address would not be included in the New Zealand figures. Addresses with no country identifier are included in the US numbers.

Improved inventory management

As mentioned before, the adoption of information technology and use of the internet can lead to improvements in inventory management. Supermarkets provide the most obvious anecdote for this kind of development. Bar-coding and the associated information technology enable supermarkets to control more efficiently the stock of goods they have on their shelves. This anecdote also has a macroeconomic counterpart. Estimates of inventories to sales ratios for New Zealand (from the quarterly manufacturing survey) trended downward during the 1990s (see figure 18). This downward trend, at least in part, reflects better inventory management techniques.²⁷

Figure 18
Ratio of inventories to sales in New Zealand



Source: *Statistics New Zealand*

²⁷ The decline in the stock to sales ratios in New Zealand and the United States may also have resulted from the reduction in macroeconomic volatility. When volatility is lower, forecast errors are likely to become smaller in magnitude. Consequently, the inventories needed to buffer against such surprises can also be smaller.

Productivity

The build-up in computing capital and the increasing importance of the information technology sector and the internet in New Zealand suggest that there is potential for productivity gains. To date, however, there has been little improvement in productivity growth, possibly because businesses have not yet fully adopted information technologies.²⁸

In particular, New Zealand's labour productivity performance, although improving over the 1990s, has been disappointing relative to the United States'. For New Zealand, the average growth rate of labour productivity over the 1990s was about 0.5 percent, compared to about 2.0 percent in the United States.

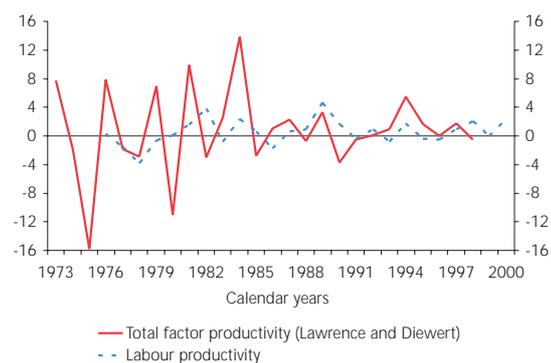
Annual growth in labour productivity (measured by output per hours worked) and total factor productivity (TFP) are plotted in figure 19.²⁹ Figure 19 shows that in comparison to the United States, New Zealand's productivity performance has been quite mediocre. Despite strong capital investment, including substantial investment in computers, productivity growth in New Zealand has not increased as strongly as in the United States. Moreover, productivity growth appears to be much more volatile. Both movements in labour productivity and TFP have been quite variable. Interestingly, though, productivity growth appears less volatile in the 1990s than in the 1970s and 1980s.

One explanation for the United States' better productivity performance is that US labour productivity may reflect a 'head-start' in new technology investment. As mentioned before, investment in information technology in the United States has increased since at least the 1980s and the recent improvements in productivity might reflect the maturation of these investments.

The composition of New Zealand's IT sector may also explain the lack-lustre productivity performance. For example, if Gordon is right and productivity gains in the United States have *not* arisen from the *use* of information technology, but

are largely confined to computer *manufacturing* and the durable goods manufacturing sector, then there may be little scope for New Zealand (and to a lesser extent other countries) to emulate the performance of the US economy.

Figure 19
Productivity growth in New Zealand
(annual percent)



Source: Lawrence and Diewert (1999) and Statistics New Zealand

4 Conclusion and further discussion

The US economy has performed remarkably well over the last decade. Strong output growth has been accompanied by low unemployment and low inflation. These facts, and recent gains in labour productivity, have led some people to argue that the United States has entered a 'New Economy' era of economic activity.

However, until the US economy has gone through a full business cycle, or indeed several, it will be difficult to determine whether the recent productivity gains reflect a fundamental structural change and permanent increase in the rate of growth of potential output, or whether they are merely a cyclical phenomenon. It is quite possible that the internet and information technology will boost productivity growth for a sustained period of time (perhaps a decade or two), reflecting the time it takes for technology up-take. An even more optimistic possibility is that these technologies may increase the rate at which new technologies are discovered, increasing the growth rate permanently.

²⁸ See <http://www.deloitte.co.nz/>. Deloitte Touche Tohmatsu's interpretation is actually that New Zealand is falling behind foreign competitors.

²⁹ See Lawrence and Diewert (1999) for the TFP measure.

US stock market valuations suggest that investors view the speed-up in productivity growth as a long-term phenomenon. Investors appear to expect significant increases in future profits, particularly from IT-related companies, or perhaps a large flow of profits over a long period of time, discounted at a low rate of interest. This view may also be overly optimistic. To the extent that the internet increases competition, profits might not be increased. However, these technological developments *do* lead to increased labour productivity – greater output per worker – since technology frees up resources that can be reallocated to other productive endeavours.

The Federal Reserve's restrained response to strong output growth and low levels of unemployment suggest that policymakers in the United States have attached some credence to New Economy theories. However, it is important to remember that signs of the New Economy occurred at a time when temporary factors helped mitigate upward pressures on inflation. These factors enabled the Fed to put monetary policy tightening 'on hold' to some extent, at least for some period of time. However, many of these factors have now begun to dissipate.

Recent macroeconomic data in New Zealand have been similarly ambiguous. Information technology is a growing sector of the New Zealand economy, and exports of computer software, computer hardware and communications equipment continue to increase in value quite rapidly, albeit from a comparatively small base.

At a microeconomic level it is clear that the New Economy is affecting New Zealand. Anecdotes abound regarding the impact of the internet and information technology. The internet contributes to the globalisation trend and provides incentives for New Zealand firms to adopt new technologies. Moreover, reduced inventory levels are evident in the data, suggestive of improvements in inventory management techniques.

Although signs of a New Economy exist in New Zealand, improvements in productivity are still rather unclear. New Zealand share valuations also do not seem to reflect expectations of New Economy productivity gains or, at the very least, these valuations indicate that investors are sceptical about their ability to cash in on these gains.

The internet and information technology are likely to have some tangible effects on the New Zealand economy. However, this impact will take time to eventuate as new information technology and the internet become more widespread. The Reserve Bank is carefully monitoring productivity and technology developments, as these can have important implications for the rate of growth at which the New Zealand economy can grow without generating inflation. In the meantime, the possibility of the New Economy adds another dimension to the uncertainty in the policymaking process. The preceding article in this *Bulletin* "Monetary policy in an uncertain world" discusses the challenges central banks face in implementing monetary policy, with particular reference to uncertainty about productive capacity and potential output.

References

- Buckle, R A (2000), "Macroeconomic stability: good luck, good policy or good management?" *ISCR Competition & Regulation Times* 1, 6-7, <http://www.iscr.org.nz/>
- Cates, A and W Kemmsies (2000), "New economy perspectives," *Warburg Dillon Read Global Economic & Strategy Research*.
- Gordon, R J (1999), "Has the 'New Economy' rendered the productivity slowdown obsolete?" *Mimeo*, Northwestern University and NBER, <http://faculty-web.at.northwestern.edu/economics/gordon/>
- Gordon, R J (2000), "Does the 'New Economy' measure up to the great inventions of the past?" *Journal of Economic Perspectives*, forthcoming, <http://faculty-web.at.northwestern.edu/economics/gordon/>
- Lawrence, D and E Diewert (1999), *Measuring New Zealand's productivity*, Report prepared for the Department of Labour, Reserve Bank of New Zealand and The Treasury, <http://www.treasury.govt.nz/workingpapers/99-5.htm>
- March, F (1999), "Statistics on information technology in New Zealand," *Mimeo*, New Zealand Ministry of Economic Development, <http://www.med.govt.nz/pbt/infotech/currentstats/>

New Zealand Institute of Economic Research (1999), *Consumer benefits from import liberalisation: a New Zealand case study*, Report prepared for the Ministry of Foreign Affairs and Trade, <http://www.mft.govt.nz/publications/consumer.html>

Oliner, S D and D E Sichel (2000), "The resurgence of growth in the late 1990s: is information technology the story?" *Federal Reserve Board of Governors Finance and Economics Discussion Series*, No. 2000-20, <http://www.bog.frb.fed.us/pubs/feds/2000/>

Organisation for Economic Co-operation and Development (1999), *OECD Economic Outlook* December 1999.

The Dominion (2000), "Customers flock to bank on the internet," 3 May, 17.