New Zealand's productivity performance and prospects[1]

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New Zealand's medium-to-longer-run growth prospects and general standard of living critically depend upon its labour productivity performance. Relative to most OECD countries, the *level* of labour productivity in New Zealand is low and, when measured as GDP per worker, the historic *growth* performance has also been relatively poor. The apparently poor performance is a key concern for policymakers and has attracted much research attention. The focus has been to understand why performance has not been better, given that cross-country indicators of New Zealand's economic environment broadly suggest New Zealand should be amongst the highest performers, not a laggard. In this article, the research is synthesised and recent official productivity data released by Statistics New Zealand (SNZ) is analysed. A key conclusion is that the historic productivity performance has in fact been significantly better than is suggested by looking at the aggregate measures of productivity in isolation, and there is some cause for optimism that this will continue.

1 Introduction

As in many OECD countries, fiscal and monetary policies in New Zealand are cast within medium-term frameworks that oblige policymakers to consider how current and projected policy settings will impact on medium-term goals. One of the key considerations in this regard is the assessment of New Zealand's underlying supply capacity, often called trend or potential output. At the Reserve Bank of New Zealand, the difference between actual output and potential output — the output gap — is a key input into the Reserve Bank's forecasts, given its empirical linkage to inflation.[2] In the New Zealand Treasury, the view taken on trend output underpins the extent to which fiscal expenditure and revenue programmes are assessed as consistent with medium- to longer- term fiscal sustainability goals.[3]

Trend or potential output is often estimated as the sum of two forces — the accumulation of inputs (principally, labour and capital) and the underlying efficiency of how those inputs are being employed in producing goods and services. Most estimates suggest that New Zealand has enjoyed a pick-up in trend output over the last decade or so, consistent with a notable improvement in actual GDP growth.[4]

The improved growth performance has been accompanied by very solid employment growth, sourced from both increases in the working-age population and increased employment rates. However, measures of productivity growth for the economy as a whole have tended to fall well below average rates for the OECD group of countries, and offer only a modest improvement over the longer-term historical experience.

Examining New Zealand's labour productivity performance has been a rich area of investigation by both domestic and international researchers. All measures of productivity suggest there is a large gap between the level of labour productivity in New Zealand and that of upper-income OECD countries. It has been a challenge to explain why New Zealand's productivity growth rate has been so low, given open capital market, and the widespread agreement that macro and structural policy settings should be conducive to, if anything, above-average productivity performances, thereby reducing the productivity levels gap. Notably, New Zealand's closest neighbour, Australia, has seen a marked improvement and internationally superior productivity performance over the last decade or so, following a roughly similar set of reforms and a roughly similar period of labour market deepening (albeit from a much less depressed starting point). Moreover, New Zealand's economy is deeply

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[1]   This article draws upon a paper prepared for the "Perspectives on Potential Output and Productivity Growth" workshop hosted by the Bank of Canada and Banque du France. The workshop was held at Enghien-Les-Bain, Paris, April 24-25, 2005.

[2]   Formally, the linkage is known as a "Phillip's curve", named after the New Zealand economist, Bill Phillips, who first demonstrated the relationship in 1958. A recent *Bulletin* article by Hargreaves *et al*. (2006) describes how a Phillips curve is used to model inflation in the Reserve Bank's core macro model.

[3]   For example, see The Treasury (2006).

[4]   For example, see OECD (2005a).

integrated with that of Australia, most obviously with many well-known firms operating at the trans-Tasman level.

The sub-par total economy productivity growth performance has also been a key concern for policymakers, as, over the medium-to-longer-term, labour productivity growth is usually seen as the key determinant of raising living standards. And, over the short-to-medium run, lifting New Zealand's labour productivity performance would seem to offer the best means for relieving inflation pressure in the economy, at least from a 'supply-side' perspective.[5] In contrast, the scope for boosting supply capacities through further increases in employment rates would appear more limited, with participation rates at record levels (and near the highest in the OECD) and unemployment rates also at comparatively low levels.

The Reserve Bank, along with other policy agencies, does indeed project a significant pick-up in trend labour productivity growth rates, to levels that might seem optimistic relative to New Zealand's recent history. In the following section, these estimates are examined along with a brief discussion of New Zealand's historic growth performance. In section 3, the literature on New Zealand productivity is reviewed with the aim of assessing whether the projected productivity pick-up is at least plausible. Finally, section 4 offers conclusions from the literature and identifies where gaps and uncertainties still remain.

2 Overview of New Zealand's growth trends

Historical overview

GDP growth in New Zealand has outpaced OECD average levels over much of the past decade (table 1). This pick-up is a marked improvement over the experience of the 1970s and 1980s, and while GDP growth merasured on a per-capita basis has not been quite as impressive, it has at least been sufficient to arrest a long-term trend decline in New Zealand's relative international living standards (figure 1).[6] Nevertheless, New Zealand's present GDP per-capita level still lags OECD average levels by around 15 percent, Australian levels by around 20 percent, and US levels by around 40 percent.

Table 1

Economic growth over the last 20 years

Average annual percent change				
Period	New Zealand	Australia	United States	OECD
1985-1995	1.8	3.3	3.1	3.0
1995-2005	3.3	3.8	3.2	2.7
2001-2005	3.4	3.2	3.2	2.1

Source: OECD, Statistics New Zealand.

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[5] Reserve Bank estimates of the output gap have been positive for some time (see RBNZ 2006), implying positive inflation pressure. Reliving this inflation pressure requires that the rate of GDP growth in the economy is slowed to sub-potential growth rates. Over recent years, the Reserve Bank has been working to relieve inflation pressure from the 'demand side' by applying a restrictive monetary policy stance. Boosting the economy's relative supply capacities may also significantly assist monetary policy in this task, although generally it is thought that such relief occurs fairly gradually.

[6] The usual caveats regarding the usage of GDP per capita as a proxy for living standards apply. One caveat that is particularly relevant for New Zealand is that with the second-highest level of net foreign debt-to-GDP ratio to service in the OECD, domestic per-capita income levels lags behind per-capita production levels by around 8 percent of GDP. As the focus of this paper concerns potential output and productivity trends, the impact of this (and other factors) on welfare, such as New Zealanders' access to relatively uncrowded beaches and forests, are not considered.
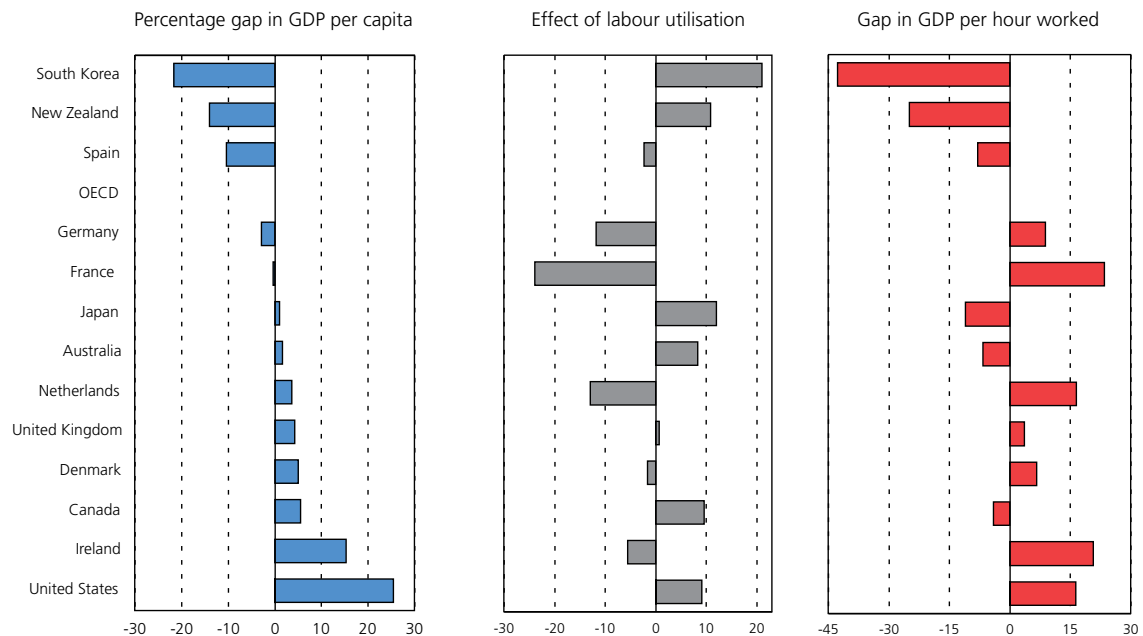
Figure 1

New Zealand's per-capita GDP performance 1970-2005
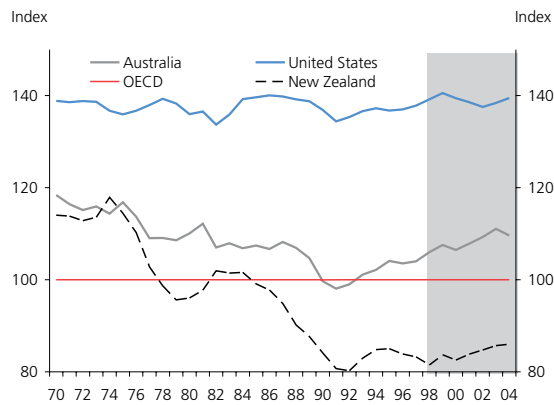
Source: OECD Factbook 2006. GDP per capita adjusted for purchasing-power parities.
OECD figures exclude The Czech Republic, Hungary, Poland and The Slovak Republic.

A useful starting point for analysing the gap in GDP per capita between New Zealand and the OECD is to break it down into the contributions from labour utilisation and labour productivity. This and other common growth decompositions seen in the productivity literature are described in box 1. The GDP per-capita break-down reveals relatively high labour utilisation rates compared to the OECD average and most countries, and relatively low labour productivity levels, especially relative to the upper-income-earning countries (figure 2).

Figure 2

Differentials in GDP per capita and their decomposition, 2004[†]

Percentage point differences in PPP-based GDP per capita with respect to the OECD

†   Based on total hours worked per capita. OECD figures exclude The Czech Republic, Hungary, Poland and The Slovak Republic.

The high labour utilisation rates currently seen in New Zealand reflect over a decade of improvements in employment rates, to the point where New Zealand now has one of the lowest unemployment rates in the OECD and a participation rate that is also fairly high (table 3). If we regard the highest employment rate in the OECD (Switzerland) as a 'natural limit', New Zealand may be able to achieve further small increases in relative per-capita incomes through boosting employment rates further. It is clear, however, that the more substantive gains are to be had from lifting labour productivity growth to rates *higher* than that observed in the advanced OECD economies.[7]

Unfortunately, the historical data does not appear to offer much support for New Zealand lifting its relative living standard via high labour productivity growth (table 2). Over the 15-year period from 1991-2005, labour input growth averaged 1.8 percent per annum, while labour productivity growth, measured as GDP per worker, averaged only 1.1 percent per annum. This labour productivity outcome represents an improvement over the previous 10 years (1985-1995), when growth averaged only around 0.7 percent. However, it still falls considerably short of long-term average OECD labour productivity growth rates of roughly 1.6 percent per annum. In addition, the more recent data (2005-2006) suggests that labour productivity growth in New Zealand has fallen further off the pace, while in the productivity leader, the US, a marked acceleration has occurred.

Table 2

New Zealand and OECD output, employment, and productivity growth

Average annual percent change			
Period	GDP	Labour Productivity	Employment
New Zealand			
1991-1995	2.2	0.9	1.3
1996-2000	2.9	1.4	1.5
2001-2005	3.4	0.8	2.6
Average	2.9	1.1	1.8
OECD Total			
1991-1995	2.9	1.5	1.4
1996-2000	3.3	1.8	1.5
2001-2005	2.1	1.5	0.6
Average	2.8	1.6	1.2

Source: OECD, *Economic Outlook* No. 80.
Labour productivity measured on a total economy basis.

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[7] The only plausible alternative to significantly lifting New Zealand's relative living standards would be an ongoing improvement in the terms of trade. This has certainly occurred in New Zealand's history; for example, during the 1950s New Zealand's relative per-capita incomes expanded on the back of booming wool prices. And today, New Zealand is also enjoying relatively high commodity prices (particularly for dairy products) and relatively low prices for many imported goods as lower-cost production expands in the Asian region. However, history has also shown that commodity price booms tend to be followed by busts as supply capacities eventually adjust. That being so, improving labour productivity levels would seem the more certain and enduring route to lifting per-capita incomes. See Borkin (2006) for further discussion on New Zealand's terms of trade.

Table 3

Employment, participation, and unemployment rates in selected OECD countries, 2005

	Unemployment rates*	Employment rates†	Participation rates
Australia	5.1	73.2	77.1
Denmark	4.8	77.1	81.0
Germany	9.5	71.1	78.2
Japan	4.4	74.6	78.0
Korea	3.7	65.9	68.5
Netherlands	3.8	74.0	77.9
New Zealand	**3.7**	**76.2**	**79.1**
Norway	4.6	75.4	79.1
Switzerland	4.5	82.6	86.3
United Kingdom	4.8	72.3	76.0
United States	5.1	71.2	75.1
OECD total	**6.6**	**66.5**	**71.1**

*   Standardised civilian unemployment rates.
†   Participation in the workforce of 15 to 64 year olds.
Source: OECD.

Box 1

Common economic growth decompositions and terminology

Output or GDP in per-capita terms is simply calculated as GDP divided by the population. *Labour productivity* measures the efficiency with which labour is employed in producing output. It is often the starting point for analysing GDP per capita, making use of the identity:

(1) *GDP/population = GDP/employment x employment/ population*

Or alternatively:

(2) *GDP/population = GDP/hours worked x hours worked/ population*

The first term on the right-hand side of equations 1 and 2 are alternative measures of labour productivity, commonly referred to as output per worker and output per hours worked respectively. The second terms are corresponding measures of *labour utilisation*. In cross-country comparisons, this distinction can be quite important. For example, labour productivity per hours worked in many European countries is relatively high, while labour productivity per worker tends to be somewhat lower. In the case of New Zealand, however, the distinction makes little difference – labour utilisation rates on both measures are relatively high, while productivity levels are relatively low.

Labour productivity can be further decomposed into improvements in the efficiency of its use via changes in the amount of capital available per worker and improvements in efficiency via the application of improved technologies or organisational processes (the latter is sometimes called labour-augmenting technological progress). This decomposition is calculated by assuming a production function of some form for the economy. For example, in the case of the Reserve Bank's core macro model, FPS, the functional form is Cobb-Douglas. In log terms, this form implies GDP can be expressed as:

$$(3) \qquad y = mfp + S_L l + S_k k$$

where y is a measure of output, mfp is *multi-factor productivity* (MFP), the combined efficiency with which labour and capital are employed in producing output; l is a measure of the labour input; k is a measure of the capital stock and S_L and S_k are labour and capital's share of value added (or output) respectively.

By rearranging equation 3 and noting that $S_L + S_k = 1$, it can be shown that:

$$(4) \qquad \Delta(y/l) = \Delta mfp + Sk \, \Delta \, (k/l)$$

where Δ denotes the change in any of the variables in (4) over some set period of time.

That is, the change in labour productivity can be decomposed into changes in MFP and changes in the capital-to-labour labour ratio. When the latter is increasing, the economy is said to be experiencing *capital deepening*.

Note that, in practice, MFP cannot be observed; it can only be calculated residually given estimates of the capital stock, the labour input and output itself. As discussed in section 3, these estimates can vary widely depending on the functional form used (especially if increasing returns to scale are permitted), the coverage of output and the conceptual basis for measuring the labour and capital inputs.

Reserve Bank estimates of trend output and productivity

As is common in most international agencies, projections for potential output at the Reserve Bank of New Zealand are constructed using a 'production function approach', as outlined in box 1.[8] This approach affords a decomposition of growth into factor inputs (capital and labour) and efficiency measures (both labour productivity and multi-factor productivity, which captures the combined efficiency with which labour and capital are employed in producing output). Historic and projected trend estimates of the factor inputs and efficiency measures are seen in figure 3. A marked slowdown in trend employment growth is seen, consistent with a view that labour absorption limits may be approaching. In contrast, trend labour productivity growth rates pick up substantially, heading towards OECD average levels at the end of the projection period.

Figure 3
RBNZ estimates of key supply-side trends

Key: ——— trend
         ——— actual
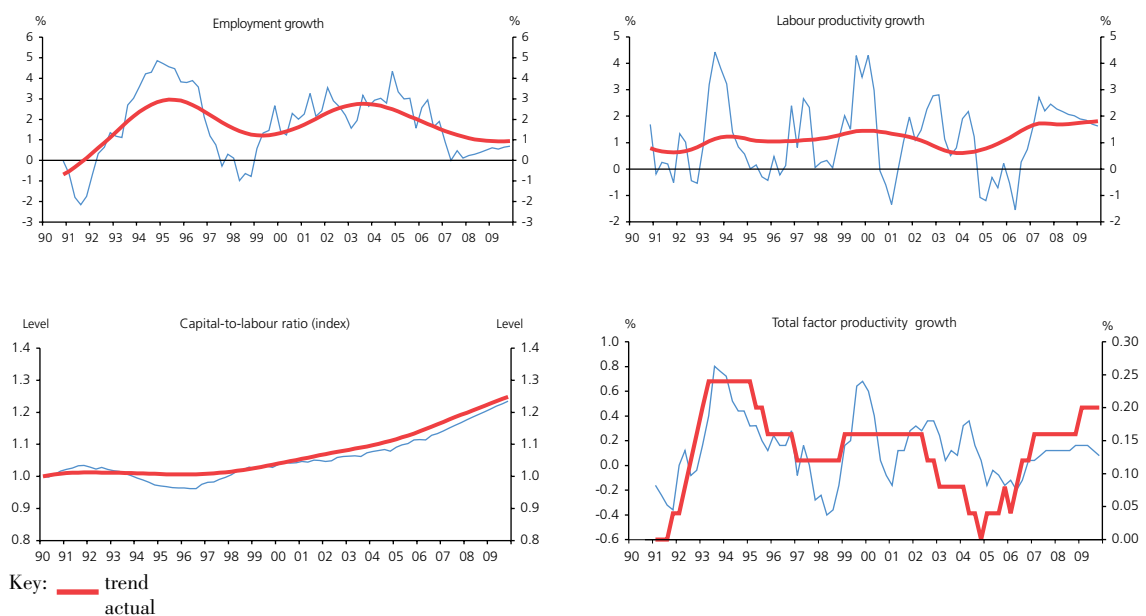
Source: RBNZ Economic Projections, March 2007.

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[8]   Over history, a multivariate filter approach described in Conway and Hunt (1997) is employed to estimate potential output.

The pick-up in trend labour productivity might be seen as optimistic in light of the historical data presented above however, most of the pick-up reflects a view that firms will meet demand by favouring capital over labour accumulation in the projection period (ie, capital deepening). Trend MFP only shows a fairly modest pick-up from current levels to levels that it is estimated were achieved in the mid-1990s. Hence the Bank's projections could also be seen as a continuation of existing trends, which suggest that the capital-to-labour ratio has been rising since the mid-1990s.[9] This is a qualitatively similar outlook to recent projections of the New Zealand Treasury and the OECD.[10]

4 Review of the recent literature

Research on New Zealand's growth experience suggests there is broad agreement on several aspects.[11] Namely, that per-capita GDP growth has improved over the 1990s but, in level terms, there is still a large gap with average OECD income levels and this gap can be 'explained' (in an accounting sense) by relatively poor labour productivity levels. There is less agreement, however, on the exact decomposition of labour productivity into its sources, given specification and measurement issues that plague such exercises, and whether recent performances are consistent with productivity levels catching up or not. In line with the international literature, identifying the determinants of labour productivity is also a contentious issue.

Measurement of productivity

Recent papers that consider the *level* of New Zealand labour productivity and a basic decomposition into the contributions from MFP and changes in the capital-to-labour ratio include: IMF (2004), Bollard (2005), Hall and Scobie (2005), Ministry of Economic Development and The Treasury (2005), and Schreyer (2005). As a whole, the results paint a picture that suggests New Zealand has both a relatively low level of capital per unit of labour *and* a low level of MFP. However, there are some significant differences in the results across these studies, principally reflecting a difference in the measurement of capital stocks, and to a lesser extent, employment inputs.[12]

There are also several papers that focus more on the *growth* of New Zealand's labour productivity and the contributions from MFP and additions to the capital stock. Drawing from index number techniques in Diewert and Lawrence (1999), a study by Black, Guy, and McLellan (2003) estimates that MFP growth in the economy has been fairly good over recent years, largely matching Australia's between 1998 and 2002. However, growth in the capital-to-labour ratio has lagged. If we take the view that the lagging performance of the capital-to-labour ratio is simply the mirror image of an impressive employment growth performance, then it follows we should not expect an ongoing drag on labour productivity growth from this source as labour market deepening runs its course. However, other evidence points to a slightly different conclusion. Using a production function approach, the OECD (2005b) estimates that New Zealand's trend MFP growth rate increased over the period 1980-2000, but that this still remains in the lower quartile of OECD countries and significantly lags Australia's performance.[13] Consistent with Black *et al.*, OECD figures also suggest capital accumulation has lagged.

At face value, the difference between the OECD (2005b) and Black *et al*. (2003) figures has stark implications – the former suggests New Zealand faces an uphill battle lifting living standards to OECD levels, while the latter suggests the process is under way. Part of the reconciliation of these differences concerns measurement of 'the economy'. In both cases, effort is made to exclude non-market activities, as productivity growth in this sector is usually not captured (inputs largely equal outputs). However, the Black *et al*. approach probably goes further in this regard, implying

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9   This assessment is based on Reserve Bank estimates of the net capital stock in 'market sectors' of the economy. A similar pick-up in the capital-to-labour ratio is seen in estimates by Hall and Scobie (2005) and in official SNZ data.

10   See OECD (2006a) and The Treasury (2006).

11   Ministry of Economic Development and The Treasury (2005), Skilling and Boven (2005), OECD (2006b), The Treasury (2004).

12   For example, capital stocks are often distinguished by whether they are measured on a total economy or some measure that excludes non-market activities, whether they are gross or net measures, and whether they have been estimated using perpetual inventory (or other) methods, or instead, are survey measures from national statistical agencies.

13   Qualitatively similar results are seen in the total economy measures produced by the OECD.

productivity growth should be measured at a higher level than the OECD figures.[14]

A recent set of data released by SNZ highlights the above point.[15] Updating the Black *et al.* approach, SNZ provides official estimates of labour and MFP productivity growth in the 'measured sector', consisting of industries where estimates of inputs and outputs are independently arrived at, measured in constant prices. This is a narrower definition of the economy than Black *et al.* consider,[16] excluding, for example, some business services. To provide a snapshot of the effects of changing economic definitions, table 4 reports labour productivity and MFP growth on measures of the economy that are increasing in the incorporation of services and the public sector as we read across the columns from left to right.

The table shows that productivity growth is lower in the total economy than in narrower measures of the market sector, particularly when services are excluded. This is also the experience of other OECD countries, given similar treatments of services and/or the non-market sector. That being so, in order to assess the figures above, we need to compare with similar measures in other OECD countries. Unfortunately, such data are not widely available. However, a broadly similar measure is reported by the Australian Bureau of Statistics (table 5). This data suggests that New Zealand's labour productivity and MFP growth performance has, in fact, outpaced Australia's in these sectors, although the average output growth rate in the measured sector has been around 0.5 percentage points lower. The data also shows that capital accumulation has been lower in New Zealand (in absolute terms and relative to growth in labour inputs).

Table 4
Alternative growth accounting measures
Average annual percent change

	SNZ 'Measured sectors' 1988-2005	Black *et al.* 'Market sectors' 1989-2004	OECD 'Business sectors' 1988-2005	Total economy OECD official put measures 1988-2005
Output	2.8	2.6	2.7	2.6
Labour inputs	0.2	0.5	1.4	1.2*
Capital inputs	2.5	1.9	2.7	3.6
Labour productivity	2.6	2.1	1.3	1.4
Multi-factor productivity	1.8	1.4	1.3	0.5

Source: Statistics New Zealand, Black *et al.* (2003), OECD.
* 1988-2004

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[14] In Black *et al.* (2003), measures of the market sector are constructed from disaggregated industry data. Their measures exclude central government administration and defences, local government services, and ownership of owner-occupied dwellings. In contrast, the OECD figures are constructed as the difference between total economy measures of output, employment, hours and investment and their government counterparts. As such, this definition excludes industries that are government owned but compete in the market place (mainly utilities), but includes residential investment.

[15] The data release is available at: http://www2.stats.govt.nz/domino/external/pasfull/pasfull.nsf/7cf46ae26dcb6800cc256a62000a2248/4c2567ef00247c6acc25713e000ab753?OpenDocument

[16] Accounting for approximately 65 percent of total GDP, sectors excluded are: government administration, defence, education, health, personal and other services, and property and business services.

Table 5

Growth in the measured sector: New Zealand versus Australia

Average annual percent change (1988-2005)

	New Zealand	Australia
Measured sector output	2.8	3.3
Labour inputs	0.2	1.0
Capital inputs	2.5	3.7
Labour productivity	2.6	2.3
Capital productivity	0.3	-0.4
Multi-factor productivity	1.8	1.2
Capital-to-labour ratio	2.3	2.7

Source: Statistics New Zealand, Australian Bureau of Statistics.

Through the lens of the SNZ split of the economy into the 'measured' and 'difficult-to-measure' sectors, three factors can be offered to explain why New Zealand's aggregate (ie, total economy) labour productivity growth performance has lagged Australia's:

1. Relative to Australia, growth in New Zealand has been more concentrated in the difficult-to-measure sectors wherein the *recorded* (if not actual) productivity gains tend be lower, given the difficulty of adequately measuring inputs and outputs independently.

2. Relative to Australia, aggregate productivity growth in New Zealand is biased downwards because the Australian statistics better capture productivity gains in the difficult-to-measure sectors.[17]

3. Alternatively, New Zealand's (unobserved) productivity growth rate in the difficult-to-measure sector is genuinely lower than what Australia is able to achieve.

At the present time, it is not possible to definitively address all of these possibilities, given data limitations.[18] However, in line with the first factor, growth in the measured sector in New Zealand has broadly matched growth in the total economy over the past 10 years, while in Australia growth in the measured sector has outpaced growth in the total economy. Second, previous work by Diewert and Lawrence (1999) suggests that at least some of the difference may be due to the Australian data better capturing productivity gains in difficult-to-measure in areas such as business services.

A rough indication of the empirical significance of these aspects can be had from calculating productivity in the difficult-to-measure sector as a residual between total economy productivity and productivity in the measured sector.[19] In table 6 below, this calculation is seen for New Zealand and Australia. It shows that, on average, productivity growth in the non-measured sector (NMS) in New Zealand has been negative at around minus 1.5 percent per annum (and negative in most years) while the rate in Australia has been positive at around 0.7 percent. This discrepancy is very large and suggests that there may well be significant bias in the difficult-to-measure sector – at a minimum, if outputs were measured as inputs, we would expect the productivity residual to average around zero.

In summary, research on the measurement of productivity trends in New Zealand is fairly unequivocal that a large gap exists with Australia and upper-income OECD countries, but that MFP growth has picked up over the last decade. There is less agreement, however, on whether the growth pick-up is sufficient to return New Zealand towards average OECD income levels, given differences between measurement of the economy and factor inputs. Recent data released by SNZ suggests that the catch-up hypothesis is plausible. However,

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[17] This would also imply that GDP levels are biased downwards.

[18] Ongoing work in SNZ on estimating productivity in the harder-to-measure sectors in a way that is broadly consistent with the the ABS approach will be informative once complete.

[19] We should not expect the residual to be a good indicator of productivity in the non-measured sector in any single year, given differences in measures of labour inputs and possible compositional shifts between and within the sectors. However, over longer periods of time, the average growth rate in the residual should be more informative.

Table 6

Proxy of productivity growth in the difficult-to-measure sector: New Zealand versus Australia

Average annual percent change (1990-2005)						
	New Zealand			Australia		
	Total economy	Market sector	Residual NMS proxy	Total economy	Market sector	Residual NMS proxy
1991	-0.1	2.5	-4.9	1.1	1.7	-0.1
1992	0.4	1.9	-2.4	3	3.2	2.6
1993	3.1	1.8	5.5	3.5	2.3	5.8
1994	1.5	5.2	-5.4	1.9	2.2	1.3
1995	-0.2	1.9	-4.1	-0.3	0.9	-2.5
1996	0.7	1.6	-1.0	2.7	3.9	0.5
1997	1.5	3.0	-1.3	2.9	3.2	2.4
1998	0.4	3.1	-4.6	3.4	4.2	1.9
1999	2.8	0.5	7.1	2.7	3.7	0.8
2000	1.6	6.5	-7.5	0.7	1.2	-0.2
2001	0.4	0.7	-0.2	1.1	0.5	2.1
2002	1.8	1.2	2.9	1.9	3.7	-1.5
2003	1.4	2.0	0.3	1.1	2.5	-1.5
2004	1	1.7	-0.3	1.3	3.1	-2.0
2005	-0.5	1.9	-5.0	-0.3	-1.3	1.5
Average	1.1	2.4	-1.4	1.8	2.3	0.7

the data suggests that capital accumulation has not been at the pace of that observed in other OECD countries. The latter issue is explored further below.

Determinants of productivity

There has been a huge literature on the ultimate drivers of productivity, the 'usual suspects' including various measures of: institutions, openness, knowledge and innovation, infrastructure, and geographic features such as population densities. A recent survey of this literature and its applications to New Zealand is seen in The Treasury (2004). As Davis and Ewing (2005) note, there appear to be at least four strands of thought regarding why New Zealand's labour productivity lags OECD country levels:

1. The general quality of policies and institutions.

2. Country-specific features of New Zealand.

3. 'Impediments' to physical capital accumulation in New Zealand.

4. Labour absorption dynamics.

These are briefly discussed in turn.

General quality of policies and institutions

There is a substantial international literature that attempts to explain productivity differences across countries in terms of policy differences (see Easterly, 2001, for a broad perspective). Much of the literature tends to define 'policies' as broad macroeconomic and institutional frameworks (particularly legal and regulatory systems) and has focused on the effects of different institutional settings between industrialised and developing countries. At this broad level, the New Zealand experience supports the hypothesis that institutions matter - productivity levels are high relative to developing countries, consistent with institutional settings that are also relatively good.

A smaller body of work has focused more on explaining differences between developed (mainly OECD) countries, potentially a greater challenge, given institutions and economic outcomes are much more homogenous. Notably, a series of OECD papers establish the empirical linkage that even within this group, policy settings help explain outcomes such as productivity differences, capital accumulation, trade and FDI openness, and employment rates (see Nicoletti and

Scarpetta 2005a and 2005b for a recent review). At this level, New Zealand's productivity performance is more of a puzzle. Institutions and policies for New Zealand tend to be assessed very favourably within the OECD group.[20] With such settings, and New Zealand's relatively low level of MFP, cross-country panel data regression results suggest that New Zealand should experience *above average* MFP growth rates.

The assessment that institutional settings are favourable in New Zealand yet MFP growth has not performed as well as might be expected, at least on a total economy basis, has led most to a focus on other factors that may explain New Zealand's productivity gap (for example, Skilling and Bowen (2005), Davis and Ewing (2005)). Of course, there may be certain small but important policies that contribute substantially to the gap; indeed, each of the other "strands of thought" outlined below also have policy dimensions.

Country specific features

A popular argument for explaining at least part of New Zealand's productivity gap is that that the productivity of New Zealand firms is dampened by the relatively small scale of domestic markets and poor access to international markets, due to distance, trade barriers and transaction costs (for example, see Skilling (2001), IMF (2004), Skilling and Boven 2005). Diewert (2004) makes a related argument that increasing scale is very important for boosting New Zealand's MFP. Recent research by Law, *et al* (2006), and Maré and Timmins (2000), using New Zealand firm-level data, lend tentative support to increasing returns to scale effects.[21]

Moreover, Battersby (2006) estimates that roughly half of the productivity levels gap between Australian States and states of the US is due to proximity and size effects. This suggests that distance and/or size may also be quite important for New Zealand. However, the hypothesis is yet, to our knowledge, to be exhaustively tested within a standard panel regression framework for New Zealand, controlling for other factors. Instead, proponents of the scale and distance argument tend to appeal to the gravity trade model literature, then use the empirical linkages between trade openness and growth to argue New Zealand must be detrimentally affected by its location and small economic size.

Critics of the distance and scale factor arguments point out that from a longer-term perspective, New Zealand's per capita incomes were amongst the highest in the OECD in the mid 20th Century, at a time when population levels were only around half of the current size and urbanisation rates were much less than today, implying less scope for agglomeration forces. In addition, traditional "distance effects" may have become less onerous over time. First, there has been a secular decline in all transport costs over the last few decades, particularly shipping and airfreight costs. Second, trade with the United Kingdom and Europe has declined markedly over the past few decades, towards trading partners are geographically closer (principally Australia, Asia and the United States).[22] Finally, as Leeper (2006) notes, both New Zealand and Australia are long-standing "outliers" from an economic geography perspective – productivity, trade and income levels are all much higher than what would be expected given the distance from world markets and relatively small population sizes.

An alternative viewpoint is that New Zealand's sectoral-specific production structure is an important determinant of the aggregate productivity outcomes. Sectoral comparisons reveal a relatively large (but stable) agricultural sector in New Zealand, and a relatively small manufacturing sector that, common to many OECD economies, has been declining as the services sector has rapidly expanded as a share of

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[20] OECD indicators of "burdensome" product, labour and financial market regulations tend to place New Zealand, along with Australia, in a group of countries that have the least onerous regulatory stances (Conway *et al.* 2005, OECD 2006b). In addition, more "mixed" indicators of policies and performance, such as The World Economic Forum's global competitiveness measures, consistently places New Zealand amongst the 20 most competitive nations.

[21] The studies find a positive association between labour productivity and labour inputs. This may reflect increasing returns to scale. However, to be more certain, other factors (notably capital) would need to be controlled for. A related literature uses the micro-data to study firm "creation and destruction". This suggests there are no obvious impediments to a good productivity performance at the firm level (see Law and McLennan (2005) and MacMillan (2004)).

[22] It could be argued that the shift in trading patterns was partly due to increasing distance effects. However, it is clear that the "centre of gravity" is shifting towards New Zealand given the ongoing growth out-performance of the US, Australia and especially the Asian region relative to Europe.

total output. Across OECD countries, manufacturing tends to be associated with relatively high productivity growth rates, particularly in the ICT sector over recent times.[23] Productivity *levels* in New Zealand's agricultural sector are at or near the best in the OECD, as might be expected given our comparative advantage in the sector and the fact that protection rates in agriculture are quite low relative to those seen in most industrialised economies (excepting Australia).[24] In this sense New Zealand's relatively large agricultural base cannot be considered as a "drag" on absolute productive performances. However, being near the frontier presents a challenge for future productivity expansion given that further gains from this position may be harder to achieve.[25]

"Impediments" to capital accumulation

The fact that labour market absorption has been so strong in New Zealand over the past decade, while New Zealand's capital stock per-worker remains low (albeit increasing over recent years), has prompted the question of whether New Zealand suffers from impediments to capital accumulation. Hall and Scobie (2005) examine the possibility that New Zealand suffers from impediments to capital accumulation that suppress its capital-to-labour ratio. The analysis is based on a simple model that allows for countries to have different levels of MFP and capital per unit of labour in equilibrium; the return to capital is equalised across countries unless some impediment (for example, capital taxation policy) drives a wedge.

The authors find some evidence of an *elevated* return to capital in New Zealand compared to Australia and OECD countries, suggesting New Zealand suffers from some kind of impediment (ie, under perfect capital mobility the

elevated return would have been eliminated as marginal products are equalised). However, the authors also find that New Zealand's price of labour relative to capital has historically been low, indicating it has been cheaper on the margin for New Zealand firms to expand production through hiring labour. Given that the relative price of labour can not decline indefinitely, they estimate substitution elasticities at the aggregate and disaggregated level to examine whether the capital-to-labour mix in New Zealand (and Australia) is responsive to changes in relative prices. Results suggest substitution effects in New Zealand fall within the range of international studies,[26] although the responsiveness of Australian firms appears much higher.

Overall, the results of the Hall and Scobie study suggest that the labour market outcomes in New Zealand has been a rational response to relative price signals, and when these signals change New Zealand firms should start accumulating capital at a faster pace, all else equal raising labour productivity levels. As discussed in section 2, this view has been explicitly built into the Reserve Bank's recent projections.

Labour-absorption dynamics

A few recent commentators on New Zealand's productivity performance suggest that New Zealand's labour productivity has been held back by the rapid increase in labour input, based on the premise that new workers drawn into the labour force tend to be less efficient than those previously employed (Parham and Roberts 2004), Davis and Ewing (2005) and IMF 2005).[27] On the other hand, Skilling and Boven (2005) note that several OECD countries (Ireland, Australia and Luxembourg) achieved both above average OECD level employment and productivity growth over the last decade and question the importance of a short run trade-off between employment growth and labour productivity growth.

[23] See Scarpetta *et al.* (2001) and Pilat *et al.* (2002). The role of ICT in explaining productivity growth has been the subject of some debate, with recent analysis suggesting that while ICT production industries are associated with rapid productivity gains, actual ICT usage in an economy may be at least as important in boosting productivity levels. In this regard, OECD indicators suggest New Zealand tends to fare well in basic ICT usage, however, broad-band take up rates and speeds are comparatively poor.

[24] See OECD (2005a).

[25] Research by Hall and Scobie (2006) suggests the agricultural sector has experienced an increase in MFP growth since the reforms of the 1980s, in part through successful integration of domestic and foreign research and development.

[26] For example, Claro (2002) and Balisteri *et al.* (2002).

[27] Note that the increase in economic welfare arising from boosting employment rates would likely considerably exceed the loss in welfare from any temporary decline in aggregate productivity growth.

The IMF's assessment relies upon a cross-country panel data study by Belorgey *et al*. (2004) on the determinants of labour productivity growth. This study estimates that the *short-run* elasticity of labour productivity growth with respect to growth in the participation rate is around -0.5. The IMF takes this estimate at face value and notes that if the New Zealand employment rate ceases to rise (or more specifically, reduces from the 1 percent annual growth rate achieved over 1992-2004 to zero in the medium term) then the annual growth rate of labour productivity should increase by half a percentage point. This would put New Zealand labour productivity growth near 2 percent per annum, a rate consistent with upper income OECD countries.

A preliminary analysis conducted by Drew *et al*. (2005) suggested that a half-a-percentage-point annual dampening of labour productivity between 1998 and 2005, as would be suggested from the Belorgey study, is well within the bounds of plausibility. The study showed that around two-thirds of the 1998-2005 net employment growth can be attributed (in an accounting sense) to growth in labour participation, reduction in long-term unemployment and natural population increase. These components can loosely be associated with relatively inexperienced workers, who might have lower levels of productivity than the incumbent workforce. On the other hand, there is some evidence that there has been a significant upskilling of the labour force over the period in question (Hyslop *et al*. 2003). Overall, the difficulty with coming to any firm view on the role of labour absorption dynamics in New Zealand is that formally testing the hypothesis requires an in-depth study of the relevant micro-level data.[28]

5 Summary and conclusions

A review of the recent literature on New Zealand's labour productivity performance suggests that 'measurement issues' surrounding New Zealand's labour and MFP growth are very important and are very sensitive to which sectors of the economy are captured in the analysis. At the total economy level, labour productivity growth appears poor relative to other OECD economies, implying little prospect of income levels converging towards average (or higher) OECD levels. When non-market and/or hard to measure sectors are excluded from productivity measures the picture appears more rosy. Recent data released by Statistics New Zealand brings home this point forcefully. In sectors where productivity growth can be inferred from independent data on inputs and outputs, productivity growth rates have in fact been above Australia's. However, by implication, this data suggests a very poor and puzzling productivity growth performance in the "difficult to measure" sectors. The ongoing program at Statistics New Zealand to expand coverage of the official productivity statistics should help in reconciling these differences.

Another finding of the recent literature is that the labour market outcomes in New Zealand appear to have been a rational response to relative price signals, and when these signals change, New Zealand firms adjust their capital-labour mix in line with what is observed in other countries. There are tentative signs that this has begun to happen over the past few years and the Reserve Bank, amongst others, projects the process will continue. In addition, there is some international evidence that suggests a short-run trade-off between rapid expansion in employment rates, as New Zealand has experienced over the past decade, and productivity growth outcomes. Further research on this issue would build the case for New Zealand having experienced a similar trade-off.

Overall, much of the recent data and literature suggests that there is scope to be optimistic about New Zealand's medium-term labour productivity growth prospects, and that being so, the pick-up in labour productivity growth rates in the projections of the Reserve Bank does not appear implausible. However, given the uncertainty surrounding the outlook, there is probably no room to be complacent about this outcome.

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28   For example, as in Gregg and Wadsworth's (2000) study of UK wages. Under their approach, wages are estimated as a function of standard variables (eg, age, gender, region, education) and a dummy variable indicates whether a worker is a new entrant. This approach allows for an estimate of the effect that new workers have on average wages, wherein the average wage is used as a proxy for average productivity.

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