

Is the cheque in the mail?

An assessment of New Zealand's medium-term labour productivity prospects *

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Abstract

Structural policy indicators for New Zealand and Australia suggest both countries have amongst the most liberal labour and product markets in the OECD. Estimates of potential output growth in New Zealand and Australia over the past decade are also amongst the highest in the OECD. Moreover, both countries weathered the 2001 global slowdown remarkably well with growth barely slowing in the region.

Despite the similar aggregate growth performances, the sources of growth have differed markedly. In New Zealand, increased labour absorption has been an important growth driver. Aggregate labour productivity growth rates, however, have tended to fall well below average OECD rates. In Australia, growth has been sourced from both relatively strong employment and labour productivity growth.

The relatively poor labour productivity growth performance in New Zealand is a key concern for policy makers. With the present unemployment rate in New Zealand well under 4 per cent and indicators of labour market tightness at all time highs, it appears the scope for increased labour market deepening is quite limited. The key question is can labour productivity growth performances be improved in order to sustain the rates of potential output growth obtained over the past decade?

In this paper, domestic and international research on labour productivity growth is synthesized, and new empirical analysis is undertaken, to evaluate whether policy makers have any cause to be optimistic about New Zealand's labour productivity growth prospects.

* The views expressed in this paper are those of the authors and do not necessarily represent the views of the New Zealand Treasury or Reserve Bank of New Zealand.

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1. Overview

Like many OECD countries, fiscal and monetary policies in New Zealand are cast within medium-term frameworks that oblige policy makers to consider how current and projected policy settings will impact on medium-term goals.² One of the key considerations for policy makers is the economies underlying productive capacity, 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 forecasts given its empirical linkage to inflation. In the New Zealand Treasury, the view taken on potential output underpins the extent to which fiscal expenditure and revenue programs are assessed as consistent or not with medium-term fiscal sustainability goals.

The historical context of the medium-term macro policy frameworks in New Zealand was a period of high inflation, rapidly expanding Government debt, and generally poor economic growth, over the 1970s and early 1980s. New Zealand probably suffered more than most in these turbulent times, given that along with the oil price shocks and ensuing world wide growth slowdown, it also had to contend with Britain's entry into the European Community which effectively closed off a key market for the bulk of its export products. To arrest the economic decline, an internationally fairly well-known set of policy reforms and economic restructuring followed in the mid-1980s and early 1990s.³ The changes to monetary and fiscal policy frameworks during this period were instituted to overcome classic time-inconsistency problems and principal-agent considerations. Other structural reforms have generally resulted in product and labour market environments that are amongst the most competitive in the OECD.⁴

Changes to economic policy settings and institutional reform laid in this earlier period have started to bear fruit. Inflation has been low and stable since the early 1990s, while fiscal surpluses have become the norm rather than the exception, resulting in a net government debt position that is now only around 5 per cent of GDP. New Zealand has also experienced a marked improvement in the rate of real economic growth over the last decade, growing above the OECD average for most of this period. This improvement has stopped the divergence in relative living standards

² The Fiscal Responsibility Act 1994 provides the legislative framework for the conduct of fiscal policy in New Zealand. Amongst other requirements, the Act specifies detailed publication of bi-annual economic projections wherein the outlook for fiscal goals (principally net debt and the fiscal balance expressed as a ratio of GDP) are seen, along with an accounting of perceived major risks to the fiscal positions. Monetary policy is governed by the The Reserve Bank of New Zealand Act 1989. This specifies that the primary function of the Bank is to deliver "stability in the general level of prices." Section 9 of the Act requires the Minister of Finance and the Governor of the Reserve Bank form a separate agreement setting out specific targets for price stability. This is known as the Policy Targets Agreement (PTA). The current PTA is a CPI inflation target of 1 to 3 per cent over the medium-term.

For details see:

<http://www.treasury.govt.nz/legislation/fra/explanation/default.asp>
<http://www.rbnz.govt.nz/monpol/pta/0127027.html>

³ For example, see Evans *et al.* (1996).

⁴ Mourgane and Wise (2005), OECD (2005a and 2005b).

between New Zealand and most of the advanced developed economies. Looking forward, the policy challenge is to sustain the recent period of good economic growth, and thereby improve living standards further.

A key vulnerability of the recent good economic growth performance is that the strong rates of labour absorption can not be relied upon going forward. With the present unemployment rate in New Zealand well under 4 per cent, employment rates near the top of the OECD league tables, and domestic indicators pointing to widespread labour shortages in the country, it appears that the scope for increased labour market deepening is relatively limited. In contrast to the excellent labour market outcomes, labour productivity growth rates have tended to fall well below average OECD rates, and offer only a modest improvement over the longer term historical experience. In other terms, despite the comprehensive scope of the reforms there appears little evidence so far that they have boosted productivity performances towards advanced developed country levels.

The sub-par productivity growth performance in New Zealand has been a rich area of investigation by both domestic and international researchers. *A-priori* it is difficult to see why New Zealand should continue to lag the rest of the OECD in this dimension given open capital markets, and the wide-spread agreement that macro and structural policy settings are generally conducive to, if anything, above average productivity performances. Moreover, New Zealand's closest neighbour, Australia, has seen a marked improvement in its own productivity performance, following a similar sequence of reforms and a roughly similar period of labour market deepening (albeit from a much less depressed starting point).

Three broad lines of investigation have been pursued to explain the differences in productivity outcomes. The default "institutional" line is that the timing lag between reforms and economic outcomes are very long and unpredictable - New Zealand will see an improvement in its productivity growth at some point even if it hasn't happened yet.⁵ A second line of investigation is that measurement errors and/or sectoral differences explain the under-performance. Measurement errors are particularly compelling in some services sectors (*e.g.* financial services) where economic integration between New Zealand and Australia is strong and organisational structures are very similar, yet New Zealand's measured productivity lies well beneath Australian levels.⁶ Sectoral comparisons between New Zealand, Australia and other OECD countries are also useful to highlight the role that differences in economic structures may play in explaining aggregate productivity outcomes. For example, New Zealand's manufacturing share of output is small relative to the OECD, and that sector tends to be associated with relatively high productivity growth rates, particularly in the ICT sector.⁷ In contrast, Australia's mining sector is relatively large and tends to be very capital intensive.

⁵ See The Treasury (2004), OECD (2005b).

⁶ See Diewert and Lawrence (1999)

⁷ See Scarpetta *et al.* (2000) and Pilat *et al.* (2003).

The third line investigates impediments in lifting productivity performances. Given human capital levels do not obviously differ from OECD average levels, and most aspects of New Zealand's labour and product market environments are seen as conducive to good productivity outcomes, perhaps the richest research vein that has been tapped in this regard are exogenous geographic features. New Zealand is further away from world markets than most other countries, and its domestic market size is tiny. This combination may significantly constrain production scale in the economy, reducing incentives for firms to invest, particularly in large scale projects requiring significant up front costs. Small scale might also restrict MFP growth via reduced competition intensities and lowered potential agglomeration effects.⁸ Another investigation of impediments concerns infrastructure development - in the recent economic boom there has been some signs of stress emerging in key transport, distribution and electricity generation networks.⁹

Whatever the cause of New Zealand's below average OECD labour productivity performances, the explicit (or implicit) view taken in New Zealand's policy agencies, and by most informed commentators, is that trend labour productivity growth will lift towards average OECD levels as capital deepening takes place.

In addition to reviewing the recent literature, the paper offers two empirical advances that seek to shed some more objective light on New Zealand's productivity growth prospects. First, a preliminary investigation of the view that strong employment growth has dampened New Zealand's labour productivity outcomes is undertaken. Second, using a multivariate Kalman-filter approach, uncertainty around New Zealand's historic trend growth is estimated in order to assess whether a pick-up in aggregate labour productivity growth rates to average OECD levels over the medium-term can be supported by the data.¹⁰ Both pieces of analysis suggest that there may be scope for higher labour productivity growth going forward, although the magnitude remains quite uncertain.

The remainder of this paper is structured as follows. In Section 2, a historical overview of New Zealand's potential output performance and its growth drivers are offered, along with policy agencies' views of the current outlook for the growth trends. Section 3 reviews the literature of New Zealand's productivity growth, highlighting what areas of the literature appear most important in reconciling productivity differences, and also where the literature is not sufficiently developed enough to offer an informative assessment. One area in this regard is labour absorption dynamics. In Section 4 of the paper, the empirical analysis is presented to test the impact of labour absorption dynamics and inferences for labour productivity growth going forward. Finally, Section 5 offers conclusions from the literature and the analysis.

⁸See Box (2001), Skilling (2001), Hansen (2002) and Skilling and Boven (2005)

⁹See IMF (2005), RBNZ(2005).

¹⁰ The approach is based on Karagedikli and Plantier (2006)

2. Historical overview of productivity trends and prospects

Economic growth in New Zealand has outpaced OECD average levels over the past decade, and has been particularly strong over the past few years (Table 1). Although growth is not as striking on a *per-capita* basis given relatively strong population growth over the period (Figure 1), there is a clear pick-up in growth rates from around 1993.¹¹ This pick-up is a marked improvement over the experience of the 1970s and 1980s, and has at least been sufficient to arrest a long-term trend decline in New Zealand's relative international living standards, as measured by output per-capita (Figure 2).¹²

Table 1 Economic growth over the last 20 years

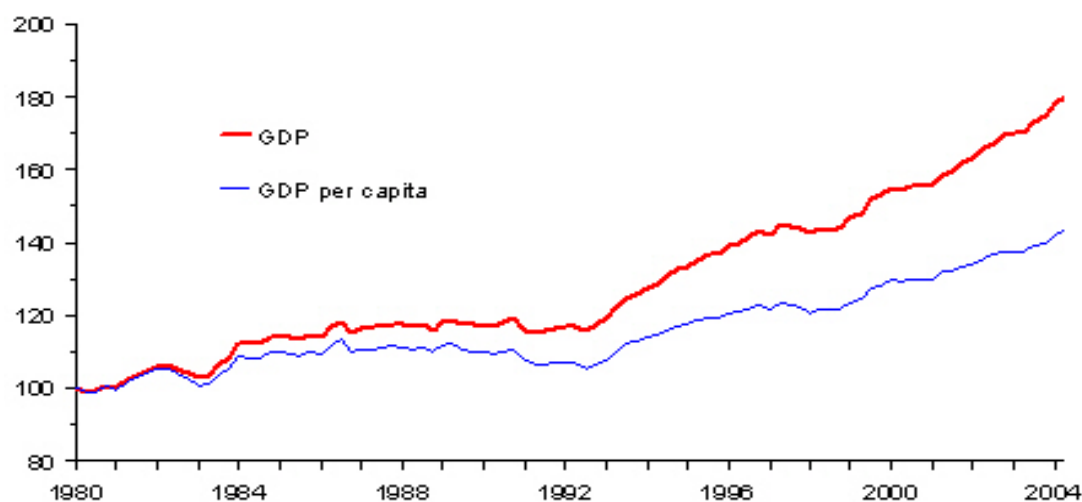
Average annual percent change

<i>Period</i>	<i>New Zealand</i>	<i>Australia</i>	<i>United States</i>	<i>OECD</i>
1984-1994	1.5	3.3	3.2	2.9
1994-2004	3.4	3.9	3.3	2.6
1999-2004	3.8	3.3	2.8	2.3

Source: OECD

Figure 1 Real GDP and real GDP per capita

Indexes, base 1980=100

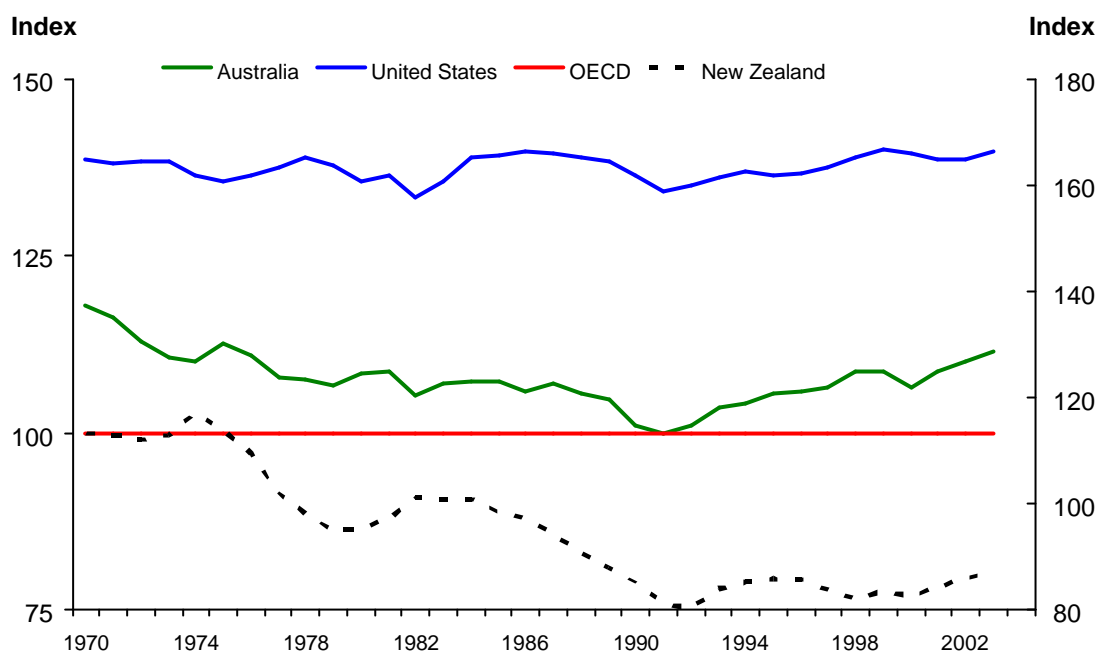


Source: Statistics New Zealand

¹¹ Formal tests for structural breaks in New Zealand per-capita and actual GDP growth rate suggest a break-point in 1993.

¹² 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 lag behind per-capita production levels by around 8% of GDP. As the focus of this paper concerns potential output and productivity trends, the impact of this (and other factors) on welfare are not considered.

Figure 2 New Zealand's per-capita GDP performance since 1970



Source: OECD

Despite the good recent growth performance, New Zealand's present GDP per-capita level still lag OECD average levels by around 10%, Australian levels by around 15%, and US levels by around 30%. A simple decomposition of this gap into contributions from labour utilisation and labour productivity (per hour) reveals relatively high labour utilisation rates compared to the OECD average and most countries, implying labour productivity levels are lower than OECD average levels, especially relative to the upper income earning countries (figure 3).

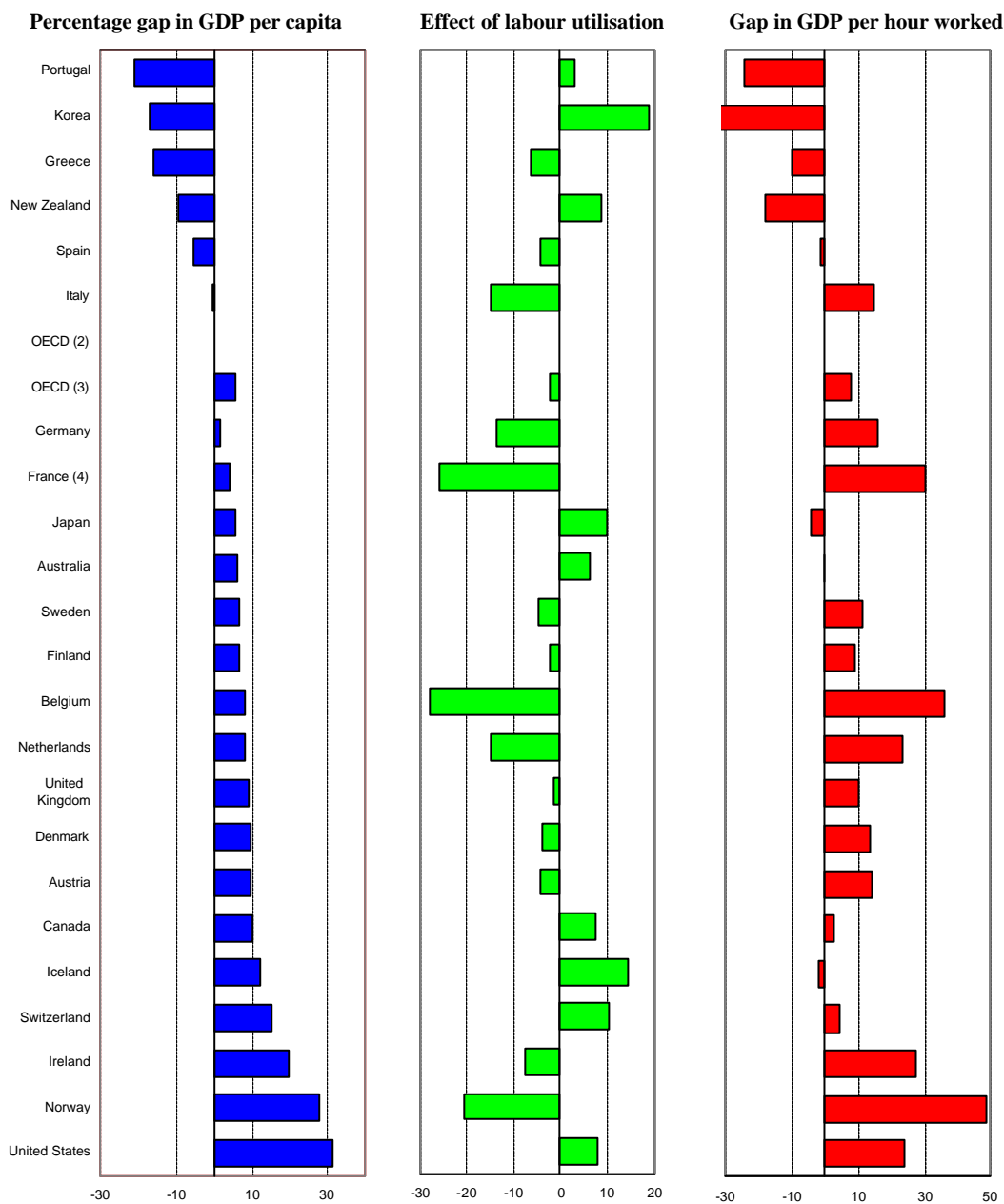
To put the current labour productivity and labour absorption gaps into a growth context, a year-by-year account of New Zealand's growth and its sources from the pick-up in 1993 is provided in Table 2 below. This shows that labour input growth has tended to outstrip labour productivity growth in most years, where the former reflects favourable demographics along with substantive improvements in both participation and unemployment rates. Over the 12 year period from 1993-2005, labour input growth averaged 2.3 percentage points (around 1 percentage points per annum from increasing employment rates), while labour productivity growth averaged 1.1%. The labour productivity outcome represents an improvement over the previous 10 years (1982-1992) where growth averaged only around 0.7%, however, it still falls considerably short of long-term average OECD labour productivity growth rates of roughly 2 percentage points per annum.

Table 2 Annual New Zealand growth since 1993

Annual percent changes, March years

March years	GDP per capita	GDP	Labour Productivity	Employment	Contributions to changes in the labour input			
					Working age population	Participation rate	Hours worked	Change in unemployment
1993	0.1	1.1	-0.5	1.5	1.1	-0.7	0.6	0.5
1994	5.2	6.4	2.3	4.0	1.2	0.6	1.4	0.8
1995	3.9	5.3	-0.4	5.7	1.4	1.1	1.0	2.2
1996	2.6	4.1	0.5	3.6	1.6	1.2	-0.6	1.4
1997	2.0	3.5	2.0	1.5	1.6	1.1	-1.2	0.0
1998	0.3	1.5	1.4	0.1	1.3	-0.4	-0.1	-0.7
1999	-0.3	0.5	0.6	-0.1	0.9	-0.6	0.3	-0.7
2000	4.6	5.2	2.7	2.4	0.7	0.2	0.6	0.9
2001	1.5	2.1	0.7	1.4	0.7	0.2	-0.5	1.0
2002	3.0	3.9	2.0	1.8	1.1	1.3	-1.0	0.4
2003	3.1	4.7	1.6	3.0	1.9	0.3	0.6	0.2
2004	1.9	3.6	1.3	2.2	2.0	0.0	-0.5	0.7
2005	2.6	3.8	0.4	3.4	1.6	1.2	0.0	0.6
Average	2.3	3.5	1.1	2.3	1.3	0.4	0.0	0.6

Figure 3: Differentials in GDP per capita and their decomposition, 2004¹
 Percentage point differences in PPP-based GDP per capita with respect to the OECD



1. Based on total hours worked per capita.
2. Average of all OECD
3. OECD, average excluding the transition economies, Mexico and Turkey
4. Includes overseas departments.

Source : OECD estimates, July 2005.

The relatively poor labour productivity growth rate in New Zealand has long been a concern of policy makers, and is at least one important factor behind the ambitious reform programs launched in the mid-1980s. As explored in the following section, more recently the issue has been the subject of much intense policy debate and research scrutiny in New Zealand.

Part of the reason for the scrutiny on labour productivity performance is that there is a growing concern that labour absorption limits may not be too far ahead. Unemployment rates are already the lowest in the OECD, at well under 4 per cent, and employment and participation rates are also fairly high, albeit not yet as high as the best performing countries (Table 3). Moreover, like most OECD countries New Zealand faces an ageing labour force which could imply outright shrinkage in the labour force within the next 15 years under some scenarios (figure 4). The combination of a fairly tight labour market currently, and longer term demographic trends, highlights the importance that lifting labour productivity growth will play for New Zealand if it is to achieve output growth gains similar to those of the last decade, or catch-up to the highest performing OECD economies.

Before beginning our assessment of the scope for labour productivity improvements it is useful to review the assumptions built into the projections of several policy agencies, in particular, The New Zealand Treasury, Reserve Bank of New Zealand and OECD (Table 4). Overall, output growth rates over the medium-term remain fairly healthy, albeit rates achieved are lower than those over the 1993-2005 period.¹³ A marked slowdown in employment growth and a pick up capital accumulation is seen, consistent with a view of labour absorption limits. In part, the switch in factor inputs offsets the employment slowdown, implying labour productivity growth rates rise (to well above historical averages in the case of the OECD and RBNZ). However, the projections might also be seen as conservative in the sense that TFP growth rates are lower than the historical rates achieved.

¹³ Partly this reflects a cyclical slowdown from a starting point output gap of roughly one percentage point across the projections.

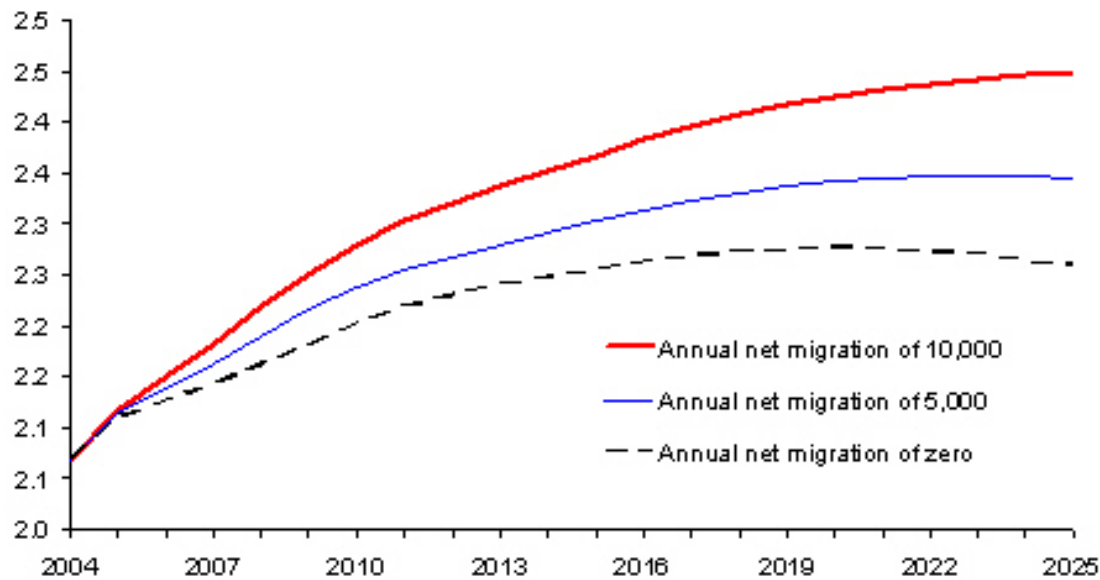
Table 3 Employment, participation and unemployment rates in selected OECD countries, 2003.

	<i>Unemployment rates¹</i>	<i>Employment rates²</i>	<i>Participation rates</i>
Australia	6.1	69.3	73.6
Austria	4.3	68.7	71.7
Belgium	7.9	59.3	64.0
Canada	7.6	72.1	77.6
Denmark	5.6	75.1	79.3
Finland	9.0	67.4	73.4
France	9.4	62.7	68.6
Germany	9.6	64.6	70.8
Greece	9.3	58.0	63.3
Ireland	4.6	65.0	68.0
Italy	8.6	56.2	61.0
Japan	5.3	68.4	72.0
Korea	3.6	63.0	65.2
Netherlands	3.8	72.7	75.4
New Zealand³	3.4	73.9	76.4
Norway	4.5	75.9	79.3
Poland	19.2	51.4	61.3
Portugal	6.2	67.1	71.3
Spain	11.3	60.7	67.6
Sweden	5.6	74.3	78.4
Switzerland	4.2	77.8	81.0
United Kingdom	5.0	72.9	76.5
United States	6.0	71.2	75.5
OECD total	7.1	64.9	69.5

1. Standardised civilian unemployment rates
2. Participation in the workforce of 15-64 year olds
3. New Zealand data is for the year 2004

Source: OECD

Figure 4 Projected labour force¹
 People in the in labour force, millions



1. Alternative labour force projections are based on different assumption regarding net migration flows. All projections assume medium fertility and medium mortality rates.

Source: Statistics New Zealand.

Table 4 Comparison of projections of policy agencies¹

	<i>OECD</i>		<i>NZ Treasury</i>		<i>RBNZ</i>	
	1993-2005	2006-2008	1995-2005	2006-2010	1995-2005	2006-2010
GDP growth	3.5	2.9	3.5	2.8	3.5	2.5
Labour productivity growth	1.2	2.0	1.2	1.4	1.2	1.7
Labour supply growth	2.3	0.9	2.3	1.5	2.3	0.8
Growth in the capital stock ¹	3.6	4.7	2.7	3.5	2.8	3.9
MFP growth	1.1	0.8	1.0	0.4	1.3	0.5

1. For consistency reasons projection were taken from the policy agencies at a similar point in time. OECD figures are from *Economic Outlook* 78; NZ Treasury figures are from the 2005 *Half Year Economic and Fiscal Update*, RBNZ figures are from the 2005 December *Monetary Policy Statement*. Note that these figures may differ from the current forecasts of the agencies' concerned.

3. Review of the recent literature

Research on New Zealand's growth experience suggests there is broad agreement on several aspects.¹⁴ 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 (2002), 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 difference in the measurement of capital stocks, and to a lesser extent, employment inputs.¹⁵

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) estimate that MFP growth in economy has been fairly good over recent years, largely matching Australia's between 1998 and 2002. However, growth in the capital-labour ratio has lagged. If we take the view that the lagging performance of the capital-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. On the other hand, using a production function approach, the OECD (2005b) estimates New Zealand's trend MFP growth rate increased towards the OECD's median rate over the period 1980-2000, but still remains in the lower quartile of OECD countries and significantly lags Australia's performance.¹⁶ Consistent with Black *et al.*, OECD figures also suggest capital accumulation has lagged.

¹⁴ Ministry of Economic Development and the Treasury (2005), Skilling and Boven (2005), OECD (2005), Treasury (2004).

¹⁵ 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.

¹⁶ Qualitatively similar results are seen in the total economy measures produced by the OECD.

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 later suggests the process is underway. 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 productivity growth should be measured at a higher level than the OECD figures.¹⁷

A very recent set of data released by Statistics New Zealand (SNZ) highlights the above point.¹⁸ Updating the Black *et al.* approach, SNZ estimates labour and TFP productivity growth in the “measured sector”, consisting of industries where estimates of inputs and outputs are independently arrived at constant prices. This is a narrower definition of the economy than Black *et al.* consider,¹⁹ excluding, for example, some business services, and the data suggest healthy labour and MFP growth rates. To provide a snapshot of the effects of changing economic definitions, Tables 5 reports labour productivity and MFP growth on measures of the economy which are increasing in the incorporation of services and the public sector as we read across the columns.

The fact that productivity is lower in the total economy than narrower measures of the market sector, particularly when services are excluded, is of course also seen in other OECD countries, given similar treatments of services and/or the non-market sector. As such, 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 6). 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 growth rate in the measured sector has been around 0.5 percentage points lower. The data also show that capital accumulation has been lower in New Zealand (in absolute terms and relative to growth in labour inputs).

¹⁷ In the Black *et al.* (2003) measures of the market sector are constructed from disaggregated industry data. The 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.

¹⁸ The data release is available at:
<http://www2.stats.govt.nz/domino/external/pasfull/pasfull.nsf/7cf46ae26dcb6800cc256a62000a2248/4c2567ef00247c6acc25713e000ab753?OpenDocument>

¹⁹ Accounting for approximately 65 per cent of total GDP, sectors excluded are: government administration, defence, education, health, personal and other services, and property and business services.

Table 5 Alternative growth accounting measures

Average annual percent change

	SNZ “Measured Sectors”	Black et al. “Market Sectors”	OECD “Business Sectors”	Total Economy OECD official put measures
	1988-2005	1989-2004	1988-2005	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
Multifactor productivity	1.8	1.4	1.3	0.5

Source: Statistics New Zealand, Black et al. (2003), OECD

* 1988-2004

Table 6 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
Multifactor productivity	1.8	1.2
Capital: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 views can be offered to explain why New Zealand’s aggregate labour productivity growth performance has lagged Australia’s:

1. Relative to Australia, growth has been more concentrated in the difficult to measure sectors wherein productivity gains are inherently harder to achieve than the measured sectors.
2. New Zealand’s productivity growth in the difficult to measure sectors has fallen beneath the rates achieved in Australia.
3. Aggregate productivity growth in New Zealand is biased downwards relative to Australia because the Australian statistics better capture productivity gains in the difficult to measure sectors.²⁰

At the present time, it is not possible to definitely address the views above given data limitations.²¹ However, previous work by Diewert and Lawrence (1999) suggests that

²⁰ This would also imply that GDP levels are biased downwards.

at least some of the difference is due to the Australian data better capturing productivity gain in business services. In addition, growth in the measured sector in New Zealand has broadly matched growth in the total economy, while in Australia growth in the measured sector has outpaced growth in the total economy.

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, and 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 catch up hypothesis is plausible, although along with other methods the data suggests that capital accumulation has lagged. The later issue is explored further below.

Determinants of productivity

There has been a huge literature on the ultimate drivers of MFP. 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 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. New Zealand’s geographic isolation from the rest of the world and/or its small population size.
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, New Zealand supports the hypothesis that institutions matter - productivity levels are high relative to

²¹ Ongoing work in SNZ on estimating productivity in the harder to measure sectors in a way that is broadly consistent with ABS approach will be informative once completes.

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 with the OECD group.²² 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 researchers into New Zealand's growth performance to conclude that there must be other factors that explain New Zealand's productivity gap (for example, Skilling and Bowen (2005), Davis and Ewing (2006)). Of course, there may be certain small but important policies that contribute substantially to the policy gap; indeed, each of the other "strands of thought" outlined below also have policy dimensions.

Geography and scale

A popular argument for explaining New Zealand's productivity gap is that the productivity of New Zealand firms is dampened by scale effects, that is, 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), Skilling and Boven 2005). Diewert (2004) makes a related argument that increasing scale is very important for boosting New Zealand's MFP. However, the hypothesis that distance and scale specifically matters for New Zealand's productivity performance is yet, to our knowledge, to be exhaustively tested within a standard panel regression framework, controlling for other factors. Instead, proponents of the scale and distance argument appeal more 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 Australia is also small scale (relative to other OECD countries) and distant – yet has higher productivity

²² 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 2006). 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.

levels than New Zealand.²³ 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 much less scope for agglomeration forces. Finally, as Leeper (2006) notes, both New Zealand and Australia are long-standing "outliers" from an economic geography perspective.

"Impediments" to capital accumulation

The fact that labour deepening has been so profound in New Zealand over the past decade and business investment rates are low relative to OECD levels 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-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 (*i.e.* 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 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,²⁴ although the responsiveness of Australian firms appears much higher.

Overall, the results of the Hall and Scobie study suggest that labour market deepening in New Zealand has been a rational response to relative price signals, and when these signals change New Zealand firms should start accumulating capital, all else equal raising labour productivity levels.

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

²³ An interesting, but largely unexplored, possibility is that scale and agglomeration effects may be important in explaining the geographical productivity disparities within the overall Australian and New Zealand economies.

²⁴ For example, Claro (2002) and Balisteri *et al.* (2002)

Ewing (2005) and IMF (2005)). An implication of this view is that New Zealand's labour productivity may accelerate in the medium term as the scope for further increases in labour utilisation rates decline. However, formal analysis of this hypothesis is fairly scarce and we use this scarcity to motivate an analysis of labour absorption dynamics in the following section.

4 Empirical Analysis

Labour absorption dynamics

This section describes a preliminary investigation into the view that strong employment growth has dampened labour productivity in New Zealand. For example, The IMF Article IV Staff Report (2005) for New Zealand asserts:

“a significant increase in employment, as recently experienced in New Zealand, can...lead to lower measurements of average productivity...the newly employed workers tend to be less productive than existing workers, which mechanically reduces average productivity.”

The IMF cites Belorgey, Lecat and Maury's (2004) cross-country study of the determinants of labour productivity growth (hence called BLM) to motivate this assessment, which includes an estimate of the elasticity of labour productivity with respect to the growth rate of the participation rate (approximately -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% 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.²⁵ This would put New Zealand labour productivity growth around 2 percentage points per annum, a rate consistent with upper income OECD countries. The 2005 OECD *Survey of New Zealand* is also sympathetic of this view, although does not quantify the impact.

At the other end of the spectrum, 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:

“...this [labour force growth] does not seem like an adequate reason to be complacent about New Zealand's labour productivity performance”

The alternative viewpoints above beg the question of whether the BLM findings can be further supported. To address this question, an analysis using New Zealand micro level labour data is undertaken.

²⁵ The IMF's figure refers to employment as a ratio of the working age population. For the remainder of this paper we use employment rate to mean employment as a share of the total population.

Conceptual Framework

To draw out the conceptual framework, it is helpful to first recall a familiar expression of labour productivity as function of capital per unit of labour, human capital per unit of labour and multi-factor productivity:

$$(1) \quad Y/L = f(K/L, H/L, MFP)$$

where Y is value-added, L is raw units of labour (i.e., hours worked with no adjustment for the difference between, say, hours worked by surgeons versus dishwashers), K is the physical capital stock and H is the human capital stock.

Human capital per unit of labour (sometimes referred to as “labour quality”) can be represented as:

$$(2) \quad H/L = f(E, X),$$

where E is total employment and X represents other relevant variables.²⁶

Ideally, we would like to estimate (2) in order to determine the impact of employment growth on H/L. One reasonably straightforward approach is to calculate an index for H by estimating wage functions, but it would be difficult to get sufficiently long time series for New Zealand data to do this.²⁷

An alternative approach is to replicate Gregg and Wadsworth (2000) study of UK wages. Under this approach, wages are estimated as a function of standard variables (e.g. 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. However, because access to the relevant unit record data in New Zealand is quite restricted the approach is not pursued in this paper. Instead, the approach taken is to present simple decompositions of labour force growth to shed light on the nature of recent employment gains. We also perform a rough set of simulations intended to gain an understanding of the *plausible size* of the impact of employment growth on labour productivity.

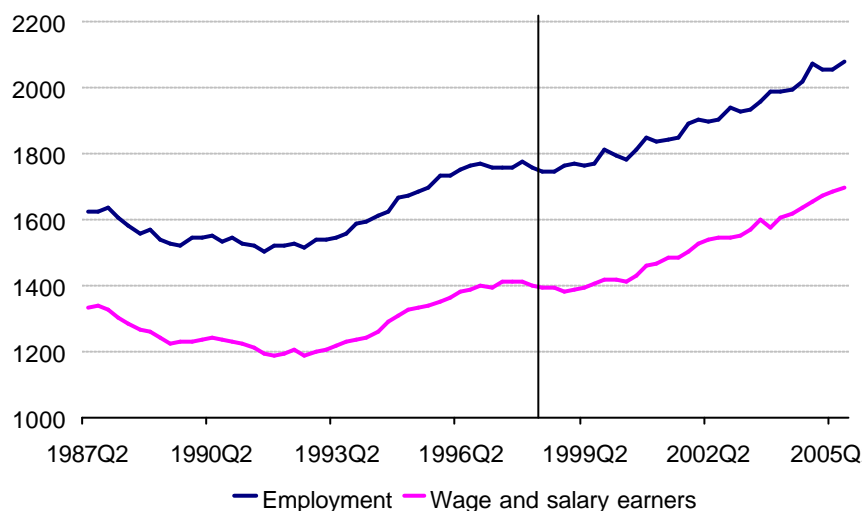
²⁶ As noted above, the IMF’s calculation is based on BLM’s estimate of the impact of the growth of the employment rate (not total employment) on productivity. However, their explication clearly refers to “new workers” – suggesting a total employment concept. In practice, the distinction is not very important, and we look at both formulations below.

²⁷ See, for example, Reilly, Milne and Zhao (2005).

Data Sources

We use data from the Household Labour Force Survey's annual Income Supplement (HLFS-IS). Focus is on the period 1998-2005 because this corresponds to a significant increase in employment (Figure 5), and in any case the data is only available from 1997. Wages are defined as “usual total earnings – weekly”, deflated by the CPI. In the decompositions section below total employment is analysed. However, the simulation exercise section uses a smaller sample (wage and salary earners only) due to a lack of wages data in the larger sample.²⁸ As shown in Figure 5, wages and salary earners employment accounts for around 80% of total employment, and tracks total employment growth fairly closely. This implies the smaller sample is not likely to bias results, unless wage growth in non wage and salary earners is very different.

Figure 5 Aggregate employment levels (000s)

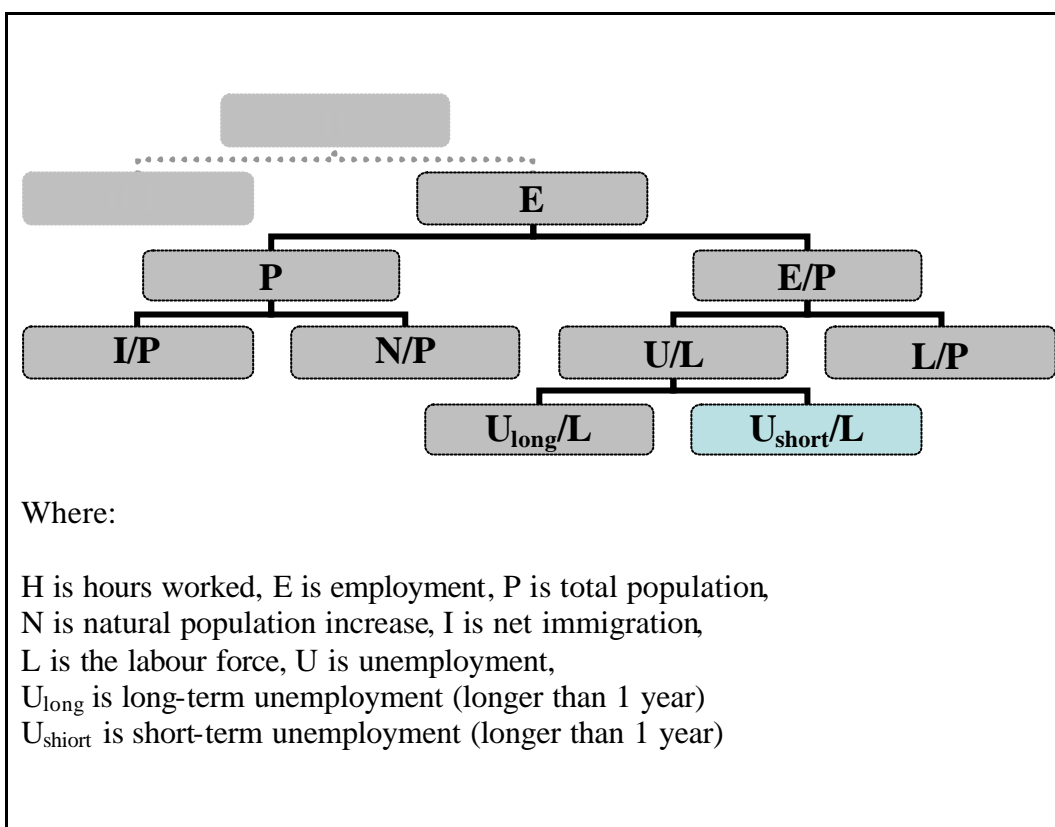


Decomposition analysis of employment growth: 1998-2005

To shed light on whether relative productivity of newly employed workers differs from the existing workforce, a decomposition of employment outlined in Figure 6 is undertaken.

²⁸Excluded are self-employed and “other” (mostly unpaid family) workers. We also discard observations for which “usual total earnings – weekly” data is missing.

Figure 6 Decomposition of employment growth



To be more specific about the decomposition in Figure 6, note that we can express the decomposition of hours worked as:

$$(4) \quad H = H/E * E,$$

which implies:

$$(4a) \quad \log H = \log(H/E) + \log E,$$

which can be expressed roughly in percentage change terms:

$$(5) \quad \% \Delta H \sim \% \Delta (H/E) + \% \Delta (E).$$

Total employment can be expressed in terms of the employment rate and the size of the population:

$$(6) \quad E = E/P * P,$$

$$(7) \quad \% \Delta E \sim \% \Delta (E/P) + \% \Delta (P).$$

The population growth rate can be decomposed into net immigration and natural population increase terms:

$$(8) \quad \Delta P = I + N$$

$$(9) \quad \%?P = I/P + N/P .$$

The employment rate can be decomposed into unemployment (or “employed share of the labour force”) and the labour force participation rate:

$$(10) \quad E/P = (1 - U/L) * (L/P)$$

$$(11) \quad \%?(E/P) \sim \%?[1 - (U/L)] + \%?(L/P)$$

Finally, we break the unemployment term into short and long-term components:

$$(12) \quad 1 - U/L = 1 - (U_{long}/L + U_{short}/L)$$

$$(13) \quad \%?(1 - U/L) = - [?(U_{long}/L) / (1 - U/L)] - [?(U_{short}/L) / (1 - U/L)] .$$

Table 7 details the decomposition of the 17.9% increase in employment that occurred between 1998 and 2005. One way to draw a broad conclusion from this decomposition is to note that the immigration and short-term unemployment components can be associated with entry into the New Zealand labour force of experienced workers.²⁹ Similarly, the long-term unemployment, participation rate and natural population increase can roughly be associated with new and inexperienced workers. These last three components “account for” about two-thirds of the net growth in employment over the period.

Table 7 **Components of employment growth**
(1998-2005, percentage point contributions)

Hours Worked					
18.6					
Employment				Average	Hours
17.9				Worked	
				0.6	
Employment Rate			Population		
9.7			7.4		
Unemployment rate		Participation	Migration	Natural	
4.3		5.2	1.9	5.6	
Unemployed = 52 wks	Unemployed > 52 wks				
3.3	1.0				

²⁹ This is a useful but loose interpretation of the decomposition. For example, immigration also includes non-working dependents.

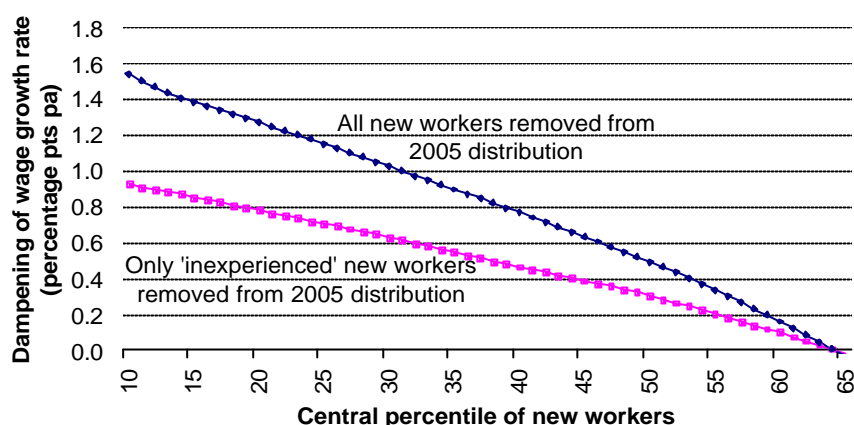
Simulation exercise

In this section, we undertake a simulation exercise to gain an understanding of the *plausible size* of the impact of employment growth on labour productivity. As noted above, we aren't able to identify in the HLFS-IS data which workers are entering and leaving employment, so we can't directly estimate the relationship between employment growth and labour productivity. Instead, we make varying assumptions about the wages of the net new workers who have entered the workforce between 1998 and 2005. We then remove these new workers from the 2005 wage distribution and calculate the average wage, which is treated as a reasonably proxy for average labour productivity, for the counter-factual wage distribution. Finally, we compare the counter-factual average to the actual 2005 average wage.

For example, in one iteration we assume that the net 1998-2005 growth in employment (308,061 workers) is centred around the 25th percentile of the 2005 wage distribution. We then remove this net employment gain (so that 2005 counter-factual total employment is equal to 1998 total employment) and compare the counter-factual and actual 2005 average wage. In this particular iteration, the resulting counter-factual 2005 average wage is 8.4% higher than the 2005 actual average wage, implying (given the particular assumption about the workers being centred around 25th percentile) that employment growth reduced average wage growth by 1.2 percentage points per annum over the period. Note that this type of exercise will tend to *understate* the impact of employment growth on the average wage because we are only removing the *net* employment gain from the 2005 distribution. The *gross* number of new workers is larger (but impossible to measure with our data).

Figure 7 presents complete results. The x-axis indicates the percentile of the 2005 factual distribution around which the 1998-2005 employment growth is assumed to be centred. The upper line maps the per annum impact of the removal of the net 1998-2005 growth in total employment. The lower line maps the per annum impact of removing a subset of net employment growth from the 2005 distribution. This subset is the net 1998-2005 employment growth attributable to reduction in long-term unemployment (more than one year) and the increase in the participation rate. As in the previous section, the idea is to focus on the component of employment growth that is accounted for by workers with little experience in employment (or significant spells of unemployment) as opposed to the component accounted for by reduction in short-term employment and increase in population.

Figure 7 **Simulation results**



The results in Figure 7 suggest that a half-a-percentage-point annual dampening of labour productivity between 1998 and 2005, as would be suggested from the BLM elasticity, is well within the bounds of plausibility.

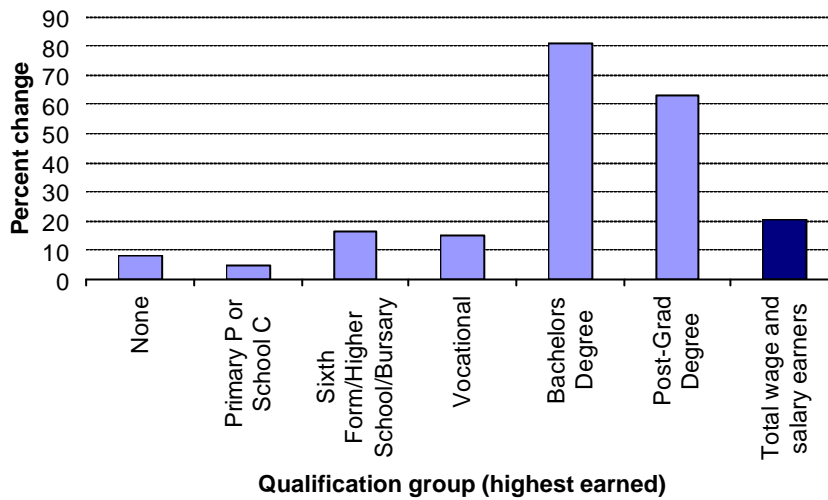
Higher level qualifications and employment growth

The analysis in the previous appeals to the idea that if we believe new workers tend to earn below the median wage, a substantial negative impact on labour productivity is plausible. However, the relative position of new workers in the 2005 income distribution is, as noted above, not something we are able to measure. One piece of evidence tends to argue *against* the idea that new workers appear particularly low in the wage distribution is that there has been a significant upskilling of the labour force over the period in question (Hyslop, Maré and Timmins (2003)). Looked at from a different angle, their analysis indicates that employment in high-qualification industries expanded while employment in low-qualification industries diminished.³⁰

Figures 8 and 9 demonstrate the upskilling (in terms of formal qualifications) of employed workers. Bachelor’s and master’s degrees account for the lion’s share of net employment growth between 1998 and 2005. Of course, as has been the case throughout our analysis, we can’t make any definitive statements about the characteristics of the new workers that joined the employed labour force during this period. However, this upskilling hints that the assumption that new workers have been coming into the labour force at particularly low wages (e.g., the 25th percentile of the 2005 distribution) may not stand up to closer scrutiny.

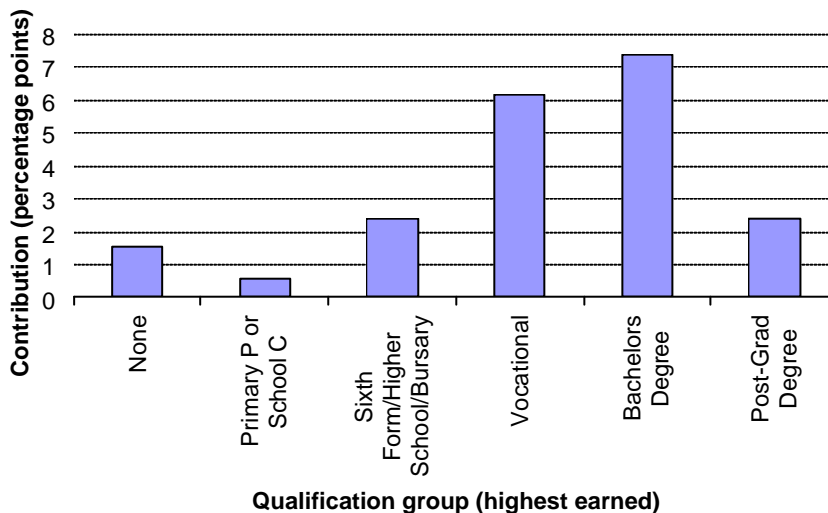
³⁰ Possible “difficult to measure” angle here though given University graduates would tend to fall into the public and services sectors?

Figure 8 Growth of employment by qualification groups (1998-2005)



Note: "Primary P or School C" refers to primary proficiency qualification or school certificate.

Figure 9 Contribution of qualifications groups to total employment growth (1998-2005)



Note: "Primary P or School C" refers to primary proficiency qualification or school certificate.

Summary of labour absorption dynamics

Three pieces of analysis regarding the thesis that substantial employment growth has dampened productivity growth in New Zealand are presented. Two of the pieces generally support the thesis. First, our decomposition analysis indicates that about 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. Second, our simulation analysis suggests that a dampening effect on labour productivity of 0.5 percentage points per annum, the difference between New Zealand recent labour productivity growth rates and upper income OECD country levels, is broadly plausible. In fact, if we assume

that the new workers added between 1998 and 2005 are centred around the 25th percentile of the 2005 wage distribution, the annual dampening of labour productivity could be higher than 1 percentage point. However, given the university-level qualification groups account for about half of the net employment gain over the period we would caution against such an assessment.

Uncertainty around growth trends

Much of the literature on productivity growth in New Zealand (and elsewhere) concerns detailed decompositions and analyses of the data in order to, first, identify any areas of under-performance and, second, to provide a direction for research on the determinants of productivity and the policy implications. This approach to the problem is entirely appropriate for researchers and policy agencies such as the New Zealand Treasury who have an interest in understanding long term growth performances.

At central banks, the focus tends to be more on aggregate relationships and medium-term forecasting. Simple frameworks are often used to assess the current state of resources pressures as a key input into the forecasts for inflation, and consequently, to motivate the stance of monetary policy. However, it is well known that estimating aggregate resource pressures is subject to considerable uncertainty given the data are often subject to revision, and commonly applied filtering methodologies have trouble distinguishing trend from cycle around the end of history (the so called end-point problem).³¹

Although uncertainty around the current state of the economy is a bane for central bank policy makers, the uncertainty surrounding unobservable variables (in this case, potential output) enables us to examine whether, in probabilistic terms, the projections for a pick up in New Zealand's labour productivity growth rate detailed in Section 2 are plausible.

Conceptual framework

There are many alternative estimation methodologies that have been proposed for measuring unobserved variables such as potential output, and detailing the pros and cons of the alternative approaches are outside the scope of this paper. Structural time series models (Harvey 1989), structural VARs (Claus 2003) and some other more mechanical de-trending methods are widely used for this purpose. Since 1998, the main technique that has been taken to estimate potential output over history at the Reserve Bank of New Zealand is a multivariate Hodrick-Prescott filter. First proposed by Laxton and Telow (1992)³², the approach augments a standard Hodrick-Prescott filter with conditioning information on the cycle, including measures of capacity utilisation and the unemployment gap. Although the main idea behind the conditioning information is that it might both reduce the end-point problems, and

³¹ For example, see Orphanides (2001) and Orphanides and van Norden (2002) for applications to the US data and Graf (2004) for an application to the New Zealand data.

³² See Conway and Hunt (1997) for the Reserve Bank of New Zealand approach.

provide a better steer on resource pressures than a simple univariate filter, in real time this technique does not appear to escape the usual end point problems. However, for our analysis, it is a useful framework, as we are more interested in an ex-post analysis of the New Zealand's trend growth rate and productivity.³³

Given the relatively long period of time that the multivariate filter has been used at the Reserve Bank of New Zealand to estimate potential output, it is reasonable to assume that the policy makers feel it delivers an adequate measure of aggregate resource pressures. It might be seen then as a good candidate for assessing what the historical labour productivity trend has been. However, in this paper, we re-specify the multivariate HP filter as a multivariate Kalman filter in order to better account for the uncertainties surrounding the approach. That is, a limitation of the multivariate HP filter is that the conditioning information is used in gap forms and the weights on the information is calibrated, implying the trends are known with certainty as are the impact of the gaps on potential output. In the multivariate Kalman filter approach, the equilibrium unemployment and capacity utilisation rates are treated as unobservable variables and the parameters are estimated.

The system of equations can be represented as:

$$(1) \quad y_t = y_t^* + e_t^y$$

$$(2) \quad l_t = l_t^* + \beta_1(y_t - y_t^*) + e_t^l$$

$$(3) \quad cu_t = cu_t^* + \beta_2(y_t - y_t^*) + e_t^{cu}$$

$$(4) \quad y_t^* = y_{t-1}^* + g_{t-1}$$

$$(5) \quad g_t^* = g_{t-1}^* + e_t^{g^*}$$

$$(6) \quad u_t^* = u_{t-1}^* + e_t^{u^*}$$

$$(7) \quad cu_t^* = cu_{t-1}^* + e_t^{cu^*}$$

$$(8) \quad l_t^* = l_{t-1}^* + gl_{t-1}$$

$$(9) \quad gl_t^* = gl_{t-1}^* + e_t^{gl^*}$$

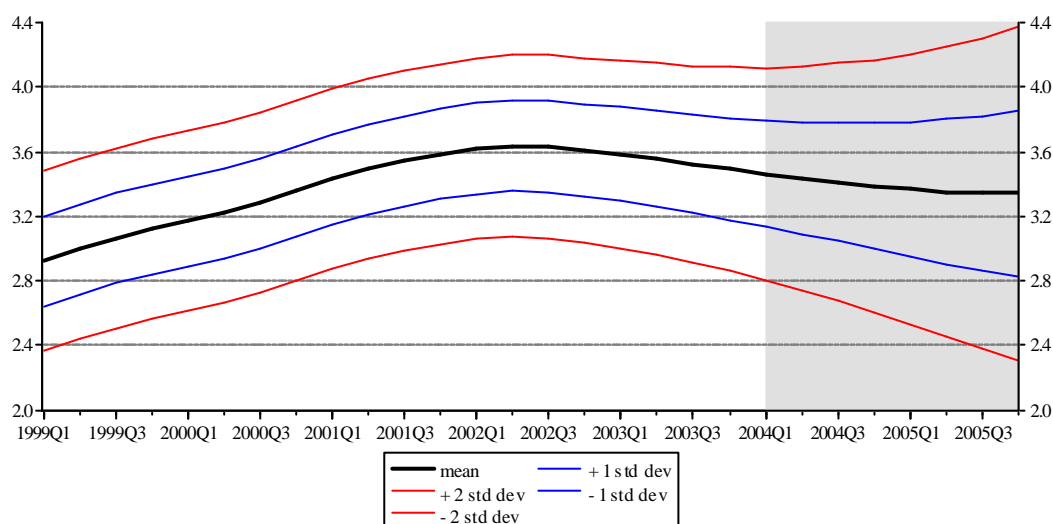
where y_t is the log of real output, l_t is the hours worked, cu_t is the capacity utilisation rate, y_t^* is potential output, g_t^* is the growth rate of potential output, while l_t^* and cu_t^* are the trend employment (hours worked) and capacity utilisation rates respectively and gl_t^* is the growth rate of the hours worked. Equations (1), (4) and (5) are the Hodrick-Prescott filter in fact, where the equation (1) equation is the measurement and the equations (4) and (5) are state equations. In order to utilise the Kalman filter to estimate the system, it is written in state-space form (see Karagedikli and Plantier (2006) for further details).

³³ Karagedikli and Plantier (forthcoming) evaluate the real time implications of different assumptions in these filters. See also St Amant and van Norden (1997).

Results

Potential output growth and confidence bands around the estimates from 1999 are shown in figure 10, while figure 11 shows trend labour productivity growth given the estimation of trend employment within the system.³⁴ Results suggest that average trend labour productivity growth rates have fallen over the past couple of years from around 1.6 to 1.2 percentage points, and lie within a 1 standard deviation band of 0.4 to 1.8 percentage points.³⁵ On the basis of these calculations, achieving upper income OECD country labour productivity growth rates of 2 percentage points appears at least *possible*, but given such levels are in the tails of the distribution not particularly likely.

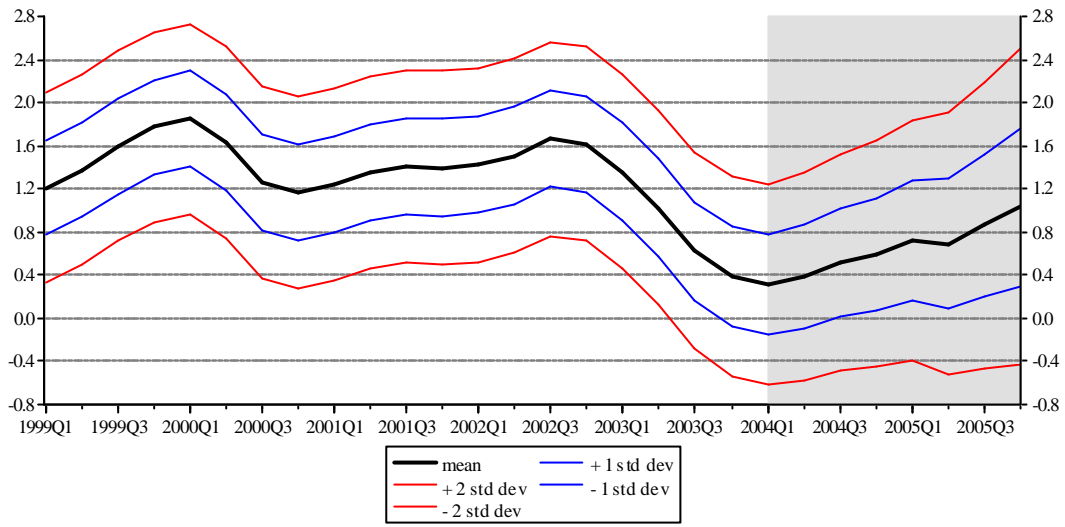
Figure 10 Potential output growth and uncertainty bands, 2000-2006



³⁴Error bands around labour productivity trends are much wider than those around potential output given the system identifies a lower degree of uncertainty around the trend employment path.

³⁵Note output growth has slowed markedly over the past year as policy settings have sought to reduce inflation pressures, but labour market outcomes have still been fairly healthy given the normally lagging relationship. The decline in trend labour productivity growth at the end of the period could then indicate that the methodology does not completely abstract from the cycle.

Figure 11 Labour productivity growth and uncertainty bands, 2000-2006
 Employment de-trended by linear time trend



5 Summary and Conclusions

This paper has reviewed the recent literatures on New Zealand's labour productivity performance and offers two new pieces of analysis to the debate. Results of the analysis on labour absorption dynamics suggest that there is scope for labour productivity growth to pick up going forward as labour market deepening runs its course, although the magnitude of the pick up remains quite uncertain and further analysis of the micro data is required in order to pin down the effects with more certainty. The analysis of trend labour productivity growth and uncertainty around this path also suggests that a pick up to a higher trend path is at least plausible.

A review of the literature highlighted the fact that "measurement issues" surrounding New Zealand's labour and MFP growth matter, particularly in the dimension of what sectors of the economy are captured in the analysis. At the total economy level, labour productivity growth appears poor and inconsistent with the hypothesis that New Zealand's institutional settings support a growth path that sees New Zealand's income levels converging towards average or higher OECD levels. At levels where non-market and/or hard to measure sectors are excluded 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, rates have in fact been above Australian levels.

Another finding of the recent literature is that the labour market deepening in New Zealand appears 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.

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 as such the modest pick-up in labour productivity growth rates in the projections of most policy agencies do not appear unwarranted. However, given the uncertainty surrounding the outlook, there is probably no room to be complacent about this outcome.

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