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OutLook

(7 November 2007)

Assets Tax and Productivity

Foreword

This series of papers has been developed to underpin the policy advocated by the New Zealand Manufacturers and Exporters Association (MEA)[1]. This Association advocates a targeted taxation approach to enhance and accelerate innovative behaviours in New Zealand firms. We draw on the analysis and experience of our membership, and other research to substantiate and present our perspective on how New Zealand can increase innovation and productivity and so enjoy a first world future. There will be several Outlook papers to follow, on the tax treatment of productive assets and monetary policy among others.

Innovation is inherently risky for any company to undertake, yet chance alone dictates that the more innovation our companies undertake, the greater the pay-off for the wider economy in the future. Only those economies that succeed in the innovation race will have a place in the world of rich nations. Consequently creating an environment that effectively encourages naturally occurring innovative behaviours is perhaps the greatest policy challenge faced by governments today.

New Zealand needs a range of policy settings that supports and encourages innovation. We advocate that this support is best delivered through the tax system, whereby those actually generating wealth are encouraged to re-invest in further wealth producing activity. Support for R&D is helpful yet our firms require further support for the downstream R&D commercialisation; expensing plant, equipment, patent costs, early stage investment deductibility and tax credits for skills development. These or similar taxation measures would form the start of a coherent framework that would stimulate and encourage a diverse range of innovation across our entire economy, arrest our economic decline and begin our climb back up the ranks of rich nations.

[1] Formed by the Canterbury Manufacturers Association (CMA) and the New Zealand Engineers Federation (NZEF) in August 2007.

Asset Taxes and Productivity

Improving productivity is an essential issue for any economy. High productivity drives economic growth and a countries overall living standards. Economists associate high levels of investment with high levels of productivity. Investment by government and business can be directed to areas of human capital, physical capital, knowledge development and knowledge application.

Not only does government largely determine the amount and direction of its own investments, it also indirectly influences all investment decisions by the policy setting framework. For example, tax policy, which is one of government's most powerful tools, has the ability to change the returns from a given investment and can influence the investments made.

The absence of tax would see investment flow to the most productive areas of the economy, and all investment decisions would be driven by the anticipated tax-free return. In the presence of taxes, investment returns must take tax into account, which alters the investment choice between different classes of assets, distorts decision-making, and often acts as the critical element that determines a particular investment. Assuming tax will always be with us, the objective could be to minimise the taxation impact on investment decisions, or perhaps to encourage the behaviours that might lead to more desirable investment outcomes in the medium term, including spill-over benefits[2]. In general, taxation distorts investment decisions, so the question is should tax policy seek to minimise distortions or should certain distortions be targeted as desirable?

For a small, capital-importing country like New Zealand, a tax system which biases behaviour towards the more productive areas of economy, and those which maximise spill over benefits, would best sustain long term growth. An investment friendly atmosphere that promotes productive and export orientated activity is desirable, equally, policy that offers incentives to more passive investments should be avoided.

The manufacturing sector is one of the largest segments of the New Zealand economy and contributed 14.7% of real GDP (2006 est.) and 30.39% of New Zealand's tradeable exports. Elaborately transformed manufactures (ETM) within the manufacturing sector alone contributed 64%[3] of the manufacture exports (year ended June 2007). ETMs are often referred to as finished goods with high added value and differentiation. ETM activity is important in improving New Zealand's productivity and economic growth. This paper will

[2] Benefits that accrue to others only indirectly associated with the investment.
[3] Source from Statistics New Zealand, Merchandise Trade by Level of Processing (LOP).

focus on the issue of current tax policy settings, the associated impact on productive investment, and the distortion in investment patterns, particularly in regard to the ETM sector.

Depreciation

Most businesses pay tax on their net profits, which is calculated by deducting the allowable business expenses from the gross income. In accounting, depreciation is a non-cash expense that represents the reduction of the value of depreciable property[4]. It has a similar effect as an income tax deduction, which means the taxable income decreases as the depreciation expense increases. A very similar term, 'economic depreciation', is often used to define the fall in market value of assets.

What's the best way to calculate depreciation? When designing a policy, the ultimate goal be it policy neutrality, incentive or disincentive, requires the tax outcomes align with the intent on different forms of investment asset classes.

In the absence of inflation, an objective might be (although in practice it is problematic) to make the tax depreciation provisions mirror economic depreciation as closely as possible. However, inflation does exist. In any given year, the inflation rate is expected to vary between 1% and 3% on average over the medium term, as intended in the Reserve Bank's Policy Target Agreement.

In times of inflation, in order to achieve neutrality, it is necessary that the asset valuations are independent of the tax rates, which means that economic depreciation is deductible and any capital gains on disposal are taxed.

As a result, there are several ways in which economic depreciation might be defined: nominal economic depreciation (NED), real economic depreciation (RED), and the historical cost approximation for economic depreciation (HCA), that is the method currently used by Inland Revenue.

As the name suggested, NED is calculated based on the nominal market value of assets, which can either be a deduction if the nominal value of the asset falls, or a tax if there are any nominal gains. Like NED, RED is calculated based on the real market value of assets. The currently used method, HCA, takes the historical cost of the asset and provides an extremely rough proxy for depreciation expense, which does not account for inflation or the real market value of the assets in any way.

[4] "Depreciable Property" means any property that might reasonably be expected to decline in value while used or available for use by taxpayers in deriving gross income, or carrying on a business for the purpose of deriving gross income.

Disregarding inflation, the real market value of the asset has a natural bias against shorter lived productive assets and supports longer-lived assets, such as land and buildings. The asset class of productive plant is essentially valued on the basis of the things it can make. If an asset is non-productive, it has little value and resale of such assets has little connection to historical costs. This is a major bias against investment in the productive plant and equipment asset class under the current tax system settings.

Longer-Lived vs. Shorter-Lived Assets

The bias can be illustrated by comparing the depreciation calculated using the different methods for both the non-depreciating assets and two-period assets. The non-depreciating assets and the two-period assets are the extremes of the longer-lived and shorter-lived assets respectively. For calculation simplicity, some key parameters are assumed, which are listed in Table 1.

Table 1 Key Assumptions[5]

Real interest rate	5.00%
Inflation rate	2.00%
Nominal interest rate	7.10%
Marginal tax rate	40.00%
Real after-tax interest rate	2.22%

Suppose that an individual can borrow or lend at 5% real interest rate, the project is a worthwhile investment as long as the investment yields a real after-tax rate of return of 2.22%. Hence, it sets out the minimum pre-tax rate of return for the investment; it is also referred to as the cost of capital.

In order to guarantee an after-tax rate of return of 2.22% (under the NED method see Table 2), all investments require a cost of capital of 5%. The real value of the depreciation deduction would be $98.04 ($100/1.02) for a two-period asset. For a non-depreciating asset, it will generate a nominal capital gain of $2, which is $1.96 ($2/1.02) in real terms.

In order to guarantee an after-tax rate of return of 2.22% (under the RED method see Table 3), all investments only require a cost of capital of 3.7%. For the non-depreciating asset, the real economic depreciation is zero each year, since the asset does not depreciate in real terms. For the two-period asset, the real value of the depreciation deduction would be $100.

Table 2 Nominal Economic Depreciation

Non- depreciating asset				Two-period assets			
Year 0		Future years		Year 0		Year 1	
Cost	100	Revenue	5.00	Cost	100	Revenue	105.00

[5] The relationship between the real and the nominal interest rate is given by $1+i=(1+r)(1+\pi)$ or $i=r(1+\pi)+\pi$ or, conversely, $r=[i-\pi]/[1+\pi]$, where *r* denotes the real interest rate, *p* the inflation rate and *i* the nominal interest rate. With a tax rate, m, the after-tax real interest rate will be $r'=[i(1-m)-\pi]/[1+\pi]$

		Capital Gains	1.96			Depreciation	98.04
		Tax	2.78			Tax	2.78
ATCF[6]	-100		2.22	ATCF	-100		102.22

Table 3 Real Economic Depreciation

Non- depreciating asset				Two-period assets			
Year 0		Future years		Year 0		Year 1	
Cost	100	Revenue	3.70	Cost	100	Revenue	103.70
		Depreciation	0.00			Depreciation	100.00
		Tax	1.48			Tax	1.48
ATCF	-100		2.22	ATCF	-100		102.22

Table 4 Historical Cost Approximation

Non- depreciating asset				Two-period assets			
Year 0		Future years		Year 0		Year 1	
Cost	100	Revenue	3.70	Cost	100	Revenue	105.00
		Depreciation	0.00			Depreciation	98.04
		Tax	1.48			Tax	2.78
ATCF	-100		2.22	ATCF	-100		102.22

Keeping the after-tax rate of return at 2.22%, a nominal deduction of $100 or $98.04 in real terms, will be allowed for the two-period asset under the HCA method (see Table 4).
However, for the non-depreciating assets, there will be neither depreciation deduction nor tax for capital gains. As a result, the cost of capital is lower for the non-depreciating asset, which means that the longer-lived assets are favoured by the current system. (Note: The calculations shown in Table 2, 3 and 4 were carried out by the Policy Advice Division of the Inland Revenue Department and the New Zealand Treasury within the discussion paper "Repairs and Maintenance to the Tax Depreciation Rules").

From the perspective of longer-lived assets, even if its real value does not appreciate, the nominal value will appreciate due to inflation. By using historical cost depreciation, the system fails to take into account the capital gains. Therefore, the longer-lived asset is under taxed and the tax liability will be lower if an asset does not depreciate or depreciates slowly. On the other hand, for the short-lived assets, its real economic depreciation is deducted from the gross income at the end of each period. Since the historical cost is in nominal terms, before deduction, it is necessary to adjust for inflation, which results in a lower real economic depreciation and a higher tax liability. As a combined effect, the current system creates a tax bias that skews investment towards the longer-lived assets.

In recent years construction costs for new buildings have tended to rise faster than the general rate of inflation, while prices for new equipment rise more slowly than the general inflation rate. In some cases, plant and equipment prices are falling. Statistics New Zealand

[6] ATCF stands for After-Tax Cash Flow.

showed that for residential buildings the price index rose by 30% between 1995/1996 to March 2004, while the index for other fixed assets fell by 10% over the same period[7]. Treating both asset classes in the same way (in terms of depreciation profile, depreciation rate and residual value) would make historical depreciation underestimate the real depreciation associated with plant and equipment. Further bias is introduced by inflation, over time, of longer-term assets and the fall of shorter-term equipment prices making the latter seriously over-taxed. Those two asset classes should be treated differently; HCA is not the best way to calculate economic depreciation.

Loading on Economic Depreciation Rates

Another feature of the current tax system is the 20% loading on economic depreciation rates. Most new assets qualify for the loading. Exceptions are buildings, second-hand imported motor vehicles and fixed-life intangible property. In practice, taxpayers depreciate their assets using the general rate set by Inland Revenue, or a special rate if there is no suitable general rate.

The 20% loading effectively increased the economic depreciation rate, which allows for accelerated depreciation. For example, if the general rate was set at 10%, with the 20% loading, the assets is allowed to be depreciated at the rate of 12%.

As mentioned in the previous section, inflation will induce bias in favour of longer-lived assets, even if it is bounded between the target ranges. In this case, depreciation loading is likely to partially offset the bias produced by inflation in favour of longer-lived assets, making investment incentives more neutral. Though it is unlikely the 20% loading is sufficient to terminate such bias. As recommended by the Policy Advice Division of the Inland Revenue Department and the New Zealand Treasury in July 2004, "it would be possible to reduce bias further by increasing the loading for shorter-lived assets and decreasing the loading for longer-lived assets".

Equipment vs. Structure

The current depreciation regime has a bias against shorter-lived and towards longer-lived assets. Consider the nature of two asset classes, equipment and structure, and the possible investment bias between them, and further the impact of such bias on the ETM activity in particular.

At shown in Table 5, compared with structure, equipment is expected to have a shorter useful life, therefore is disadvantaged by the tax system. Firms can be "labour" or "equipment intensive" rather than "structure intensive", and productivity per person depends

[7] Source: *The Future of New Zealand Manufacturing*, Peter Crawford (2004), p.23.

on the equipment investment intensity or investment per person. The ETM sector must invest significantly in plant and equipment to remain competitive and as equipment develops, it is really a machine with an embedded computer (more computer than machine) that quickly becomes obsolete.

Due to equipments limited life and relatively restricted application, equipment is likely to have a lower residual value, dependent to a large extent on having a role in a functioning supply chain. If the chain breaks, equipment in the chain is likely to be worth only scrap value. Additionally equipment in the ETM sector is exposed to technological obsolescence, and that such equipment reaches a lower residual value much faster than more basic equipment types. Thus, over a relatively short time the difference between depreciated value and the real value becomes much greater.

A clear and high residual value can only be considered in an active second-hand equipment market, which is not the case in New Zealand due to small and decentralised business demographics. Further, in the ETM sector the nature of businesses is very diverse, making the transfer of equipment difficult.

Table 5 Comparison Between Equipment and Structure

	Equipment	Structure
Useful life	Shorter (much less 10 years)	Longer (>50 years)
Application	Limited	General
Technology	Highly related	None
Residual value	Low	Appreciating
Risk	Higher	Lower

Finally, business anticipates more risk when investing in equipment. ETMs are distinguishable from their simple manufacturing counterparts by conducting R&D intensively. R&D involves risk; equipment based on, or supporting new products, has greater uncertainty that depresses the residual value of those assets. Failure of the tax system to take such risks and uncertainty into account produces biases against risky yet potentially highly productive behaviour and investments.

There are higher incentives to invest in structure than equipment. Policy should be adjusted to remove the bias and steer incentives towards the more productive areas of the economy.

Determination - Depreciation Rate

Looking into the details of depreciation rate determination, the most important thing for calculating depreciation is the depreciation rate. Inland Revenue sets diminishing value economic depreciation rate[8] for all depreciable assets[9] following the formula:

$$1 - \left(\frac{\text{residual value}}{\text{cost}}\right)^{\frac{1}{n}}$$

Where 'n' is the estimated useful life of the assets.

There are three parameters within this formula. The first one is the monetary cost of acquiring the asset, which should be straight-forward for most assets.

The second one is the residual value, which is the value of an asset that is not depreciated throughout the life of the asset. Inland Revenue determines residual value of an asset by selecting the greater of the following:

- 13.5% of the original cost.
- The estimate of the asset's market value (GST exclusive) at the end of its estimated useful life, which must be a reasonable estimate made at the time of purchase.

It is expected that the estimated residual value at the time of purchase will be largely inaccurate. After all, it is difficult to predict the scrap value without hindsight. Technological-dependent sectors are exposed to high risk in terms of loss in value or obsolescence of their equipment, due to competition and technology changes. Overall, the risk is largely a downside one – it is more likely that productive equipment value approaches zero when the business fails, than soars up when the business succeeds.

The absence of an active second-hand equipment market makes any residual value of equipment vanish with the failure of the firm. Conversely, even if the firm enjoys huge success, the value of the equipment would not rise as the technology and competition makes nearly all productive equipment obsolete. The 13.5% floor on the residual value acts as bias against short-term and high-tech equipment. Nevertheless, 13.5% residual value is crudely applied to all types of assets. The tax authority should consider a higher residual value for structures as they tend to appreciate, or at least hold their value over the long run, as their transferability is high and its value does not contain any knowledge or technology context.

[8] A straight-line equivalent depreciation rate is also prescribed if the taxpayer prefers to use the straight-line method.
[9] Fixed-life intangible property's depreciation is calculated using the formula: 1/ legal life (years).

The third parameter is the estimated useful life of the assets. According to the definition provided by the Inland Revenue Department, it is "the period over which the assets might reasonably be expected to be useful in earning income in New Zealand"[10]. The term "estimated useful life", as used by Inland Revenue, fails to capture the concept "economic life". The calculation takes into account factors such as likely wear and tear, the passage of time, exhaustion and obsolescence, though many factors such as competition and technology acceleration are not taken into account for the estimation. Often machines continue in partial or periodic "standby" use, and in these terms useful life can be much longer than economic life.

Equally for many SMEs, the capacity of a given machine might be far greater than the required output, so machines might be used well past the end of their economic life. The enormous change in technology over recent times needs to be captured. Failure to address these differences punishes investment in shorter life technology-dependent equipment.

It is impossible to develop depreciation rates such that might be agreed by all sectors of the economy. Instead, given the recognition of the inaccuracy, it is possible to compensate those who are disadvantaged, or go further, and support those who display desirable, productive behaviour.

The Current Correcting Mechanism

Inland Revenue tries to correct bias by means of a special depreciation rate. When the firm believes the general depreciation rate that the IRD has set is not appropriate for an asset, because of the factors like the intensity of usage, residual value. The owner can apply for a special rate. To qualify for a special rate, the suggested new rate must be halfway or more to the next rate in the general rates table, either higher or lower. After the application has been accepted, there are three steps[11] to consider before the rate is set. This might take a couple of months and when no decision is made within six months, the application is treated as expired, unless there is agreement on an extension of time.

It is true that this mechanism is able to deal with some special depreciation cases, but it is undoubtedly costly in terms of time and effort for the IRD, and near impossible for the bulk of New Zealand's ETM SMEs to accommodate. The special rate system cannot be seen as an appropriate solution.

[10] Inland Revenue Department & New Zealand Treasury (2004) Repairs and Maintenance to the tax depreciation rules.

[11] Three steps are preparing a draft determination, holding a conference and issuing the determination.

Recent Efforts

In the 2005 Budget some efforts were taken to correct the imbalance between equipment and buildings. First, double declining balance depreciation of equipment for tax treatment was permitted. Instead of allowing straight-line depreciation deductions of 5% per annum over the 20 years life-time, the assets would receive a diminishing value depreciation of 10% per annum. This change redresses some of the previous bias towards long-lived assets and should have positive effects on equipment investment and associated productivity. Secondly, the threshold for immediate write-off was also raised from NZ$200 to NZ$500 which lowers compliance costs on large numbers of small items. Also, R&D deductions can be carried forward under a wider range of shareholder changes.

References from Other Jurisdictions

Many other jurisdictions are providing significant tax incentives/support for productivity enhancing investment than is the case in New Zealand:

- In the **United Kingdom**, first year allowances on plant and machinery for small businesses is 50%. Computer (which is a typical technology enhancing equipment) costs are allowed to be expensed until 2004 as the government wanted to boost the high-tech industry. These are clearly moves to support SME and high value-added sectors[12].

- In **Singapore**, automated equipment and computers may be fully written off in the year of purchase. Other equipment and plant are written down over three years. Items less than $1000 Singapore Dollars (about $855NZ) can be expensed. Double-declining depreciation is allowed for export promoting R&D. In addition, supporting the aim to becoming the "a patent hub", patent expenses such as registering for patents and examination costs are expensed[13].

- In the **United States**, businesses can choose to deduct, or defer and amortise R&D expenses (including equipment and machines used for R&D). The costs of obtaining a patent, and attorneys' fees incurred throughout the patent application are R&D costs and therefore can be deducted, if the business chooses to do so, in the year incurred. The taxpayer does not need to obtain consent from the federal tax authority when making the deduction. However, costs in purchasing another's patent are not research and experimental costs.

[12] See Inland Revenue of UK: http://www.hmrc.gov.uk/manuals/senew/SE36731.htm.
[13] See: Singapore Economic Development Board: http://www.sedb.com/edbcorp/sg/en_uk/index/investors/taxation.html#0019.

- Threshold for immediate write-off in the **United States** is $102,000US (2004) and indexes to inflation afterwards, though it is going to return to $25,000US in 2006.

- The depreciation rates for a patent in **France, Germany** and **UK** are 20% to 25%, about four to five years of depreciable life, even if calculated on a straight-line basis. Patents and trademarks are depreciated over three years in Italy.

- In **Australia**, R&D costs are subject to 125% tax deduction in the first year occurred. Companies with three years record of claiming R&D tax deduction are eligible for 175% deduction rate. The 175% premium covers R&D salaries and wages, contracts to registered research agencies and others for performing R&D activities on behalf of the company[14].

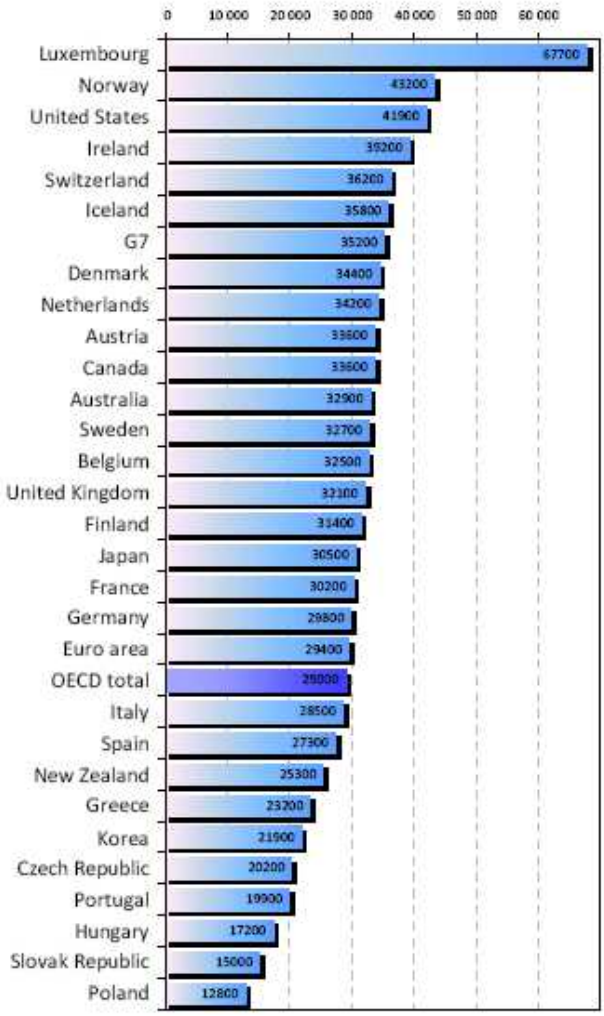
- In **Taiwan**, plant and equipment are depreciated over half of the economic life. For assets with economic life less than 2 years, immediate depreciation is granted. This policy aimed at raising productivity by updating productive equipment[15].

[14] Source: *R&D Tax Concession Information Bulletin, No. 36*, Australia Industry, July 2002, http://www.ausindustry.gov.au/library/IB3620020801110220.pdf

[15] From more information on Taiwanese Industrial policies, see http://www.cma.org.nz/index.cfm/media_releases/viewpoint_050526.html

Figure 1: GDP per capita

USD, using current PPPs, 2005



Conclusion

The 2006-2007 edition of OECD figures shows that New Zealand's GDP per capita is $25,300US, which is ranked 22nd amongst the OECD (see Figure 1). This rank has been sliding for several decades. In spite of the fact that New Zealand has been enjoying higher than average growth among OECD in the last ten years, there is still some considerable way to go before climbing back up to the top half of OECD.

Our R&D commercial out-turns and capital intensity are well below those of other developed countries, and since these are the most critical factors in determining long run productivity and economic growth, GDP per capita is unlikely to increase much faster. How to encourage and strengthen these activities in New Zealand should be the consideration at the core of policy development. It is clear that many other jurisdictions are choosing to use the taxation system to bias behaviour in their economies; New Zealand has started down that path but has a lot of catching up to do.

The immediate write-off of productive plant, equipment and patents will encourage all these value enhancing activities. The only risk to crown revenue, is the failure of the firms that make the investment, this aside, all else is timing. The argument to correct the bias against short lived assets can be justified as supporting growth and providing the spill-over effects of productivity enhancement and capability development across the economy.

Only those economies that succeed in the innovation race will have a place in the world of rich nations. The policy position of the Manufacturers and Exporters Association is that it is best to create an environment for innovation in ETM firms by:

Encouraging more investment in productive activity:

- A balanced taxation regime across income, profits and realised capital gains[16].
- Extended deductibility on early stage investment for R&D based firms.

More R&D based commercial outturns in ETM firms:

- Tax credit for R&D (implemented April 2008, see our R&D Outlook).
- Expense all productive equipment and patents (the subject of this paper).
- Tax credit for people and skills development targeted at new products and process.

A range of policy settings is required to support innovation. Expensing plant, equipment and patent costs, early stage investment deductibility and tax credits for skills development would provide a commercialisation framework for the R&D Tax credit to be introduced in April 2008, forming a coherent approach to encourage a diverse range of innovation across our entire economy.

[16] The family home should be exempt from capital tax.