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Mining in the New Zealand Economy

Like most productive activities, mining contributes to human welfare. Also like most economic activities, mining is best done where the relevant resources are relatively abundant and where economic costs (in the widest sense) are lowest. Mining will not increase economic welfare – on the contrary, it will often reduce it – if done in the wrong place, or in the wrong way, or without a proper legal and regulatory framework. Mining therefore presents industry-specific problems for regulators and policy makers, which cannot be finessed by overgeneralised rhetoric or glamorous photography. This paper reviews some of the key policy issues to be borne in mind in the ongoing debate over the expansion of mining activity in New Zealand's conservation estate, and summarises the results of some recent statistical research on the economics of mining in New Zealand.

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The resource curse

The literature on economic development categorises mining as one of a set of resource-intensive extractive activities that present problems both for macroeconomic management and for governmental integrity. The general term for these issues is the 'resource curse'. Empirically, the 'curse' is a negative observed relationship between reliance on natural-resource exports and economic growth performance: countries which rely heavily on resources-based exports grow more slowly than the average (Van Wijnbergen, 1984; Sachs and Warner, 2001; Gylfason et al., 1999). Probably the best-known example is the deindustrialisation in the Netherlands and then the United Kingdom that followed large-scale discovery and exploitation of North Sea oil and gas, and which became known as 'Dutch disease' (*Economist*, 1977).

Three Australian economists led the economic theory of the resource curse: Bob Gregory, Max Corden and Peter Neary (Gregory, 1976; Corden, 1983; Corden and Neary, 1982; Neary and Van Wijnbergen, 1985). In their analysis, a minerals boom would tend to drive up the real exchange rate, thereby squeezing the profitability of other tradable-goods producers and producing a lopsided economic structure in which industrial production for the home market tended to atrophy. In so far as manufacturing contributes more to technological dynamism than

primary commodity production, the restructuring would tend to slow down the economy's growth.

More recently, economists have focused on a second way in which minerals booms damage growth: via erosion of an economy's regulatory and policy-making capability due to the ability of large mining companies to fund intensive lobbying for special favours, a process known as 'rent-seeking' (Bulte, Damania and Deacon, 2005; Mehlum, Moene and Torvik, 2006; Robinson, Torvik and Verdier, 2006). When successful, rent-seeking produces distorted policy regimes which reward the lobbying interests at the expense of the rest of the economy, potentially doing more damage to the growth of small and medium enterprises in sectors that are unable or unwilling to pour scarce resources into countervailing political lobbying to re-level the playing field.

The resource curse is now a staple of the economic development literature. The conclusion from four decades of research on the topic is that there are real negative spillovers from resource-based industries into other tradable goods sectors, and that careful policy management is required to secure growth on the basis of resources-based exports (Gylfason, 2001). Policy makers need to tread carefully, and the wider public needs to be sure that the nation's policy-making and regulatory institutions are not captured and distorted by industry rent-seeking.

In New Zealand, mining has generally been too small a part of the economy to make the resource curse a serious macroeconomic issue. General-equilibrium economics always expects some crowding-out of non-mineral tradables by large mining developments via real exchange-rate appreciation (for a recent example, see table 3 in Layton, et al., 2010, p.23), but the deeper economic policy questions here relate to more diffuse negative spillovers from mining or other large-scale resources-based development, such as damage to the national branding of pastoral and tourism exports, loss of the existence and option values of natural landscapes and ecosystems, and the potential for regulatory capture by large mining interests.

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Balancing competing values

Over the period 1978–1984 there was intense public debate over a raft of large resource-based projects promoted under the slogan 'Think Big'. Several of these projects were driven by the government's wish to make early use of the recently-discovered and very large Maui gas field. It remains unclear how much of the political momentum derived from large-industry lobbying and how much from the desire of ministers to burnish their 'development' credentials, but the outcome was a series of legislative and regulatory decisions[1] that heavily discounted environmental and other non-market impacts of the projects and provided substantial underwrites for high-risk large industrial ventures, several of which turned out badly at high cost to taxpayers.

Following the 1984 change of government, a number of lessons from the Think Big experiences were applied to institutional design in the areas of planning law and environmental protection. One outcome was the Resource Management Act 1991 (regularly targeted by various large 'developer' vested interests as an undue obstacle to their commercial projects). Another was the Conservation Act 1987, which set aside large areas of Crown lands, most of them formerly controlled by the New Zealand Forest Service, to be administered by the newly-established Department of Conservation for the primary purpose of conservation. Only non-consumptive activities – recreation and (appropriate) tourism – were to be 'fostered' (s6e) by the department; all other commercial activities (except for mining) had to secure a 'concession' from the minister of conservation, who was to weigh up a number of potentially competing values, amongst which conservation values were to predominate, before granting permission (s17, especially 17Q and 17U).

Mining was from the outset an anomaly, because mining companies' access to Crown lands was granted by a different minister under the old Mining Act. Mining activities were explicitly exempted from the Conservation Act under section 17O(3), and this separate status was translated into a special 'access' arrangement under section 61 of the Crown Minerals Act (which replaced the Mining Act in 1991). 'Access' required a project to pass a much less demanding set of tests than those faced by non-mining projects under the Conservation Act, leaving the conservation estate less protected from mining than from other commercial development. Hence the current debate over the extent to which mining ought to proceed on conservation lands.

New Zealanders are generally relaxed about mining activity that extracts obviously useful things for the general good. Quarrying, for example, is the dominant open-cut mining activity around the country, and supplies essential inputs to roading and construction. Most places have a quarry in the vicinity. Most of the mining consents in the conservation estate have been for quarrying, and most of those have been uncontroversial.

In considering whether particular types of mining ought to proceed in particular conservation areas, therefore, the issue is not whether the mining sector *in general* should be encouraged or discouraged. The problem is to adjudicate among competing values, including non-market, and often non-quantifiable, ones. This brings us to social cost-benefit analysis (SCBA), the economist's way of systematically thinking through the full implications of a project, taking account of all relevant costs and benefits, both quantifiable and unquantifiable.

Done properly, SCBA provides an antidote to two common pathologies that afflict policy making: the temptation to look only at benefits and ignore costs (under constant pressure from vested-interest lobbyists seeking to 'boost' their pet projects),[2] and the temptation to focus on quantifiables while putting non-quantifiables into the 'too hard' basket.

In an ideal world, of course, everything would be quantifiable. The regulator or analyst would have available full valuations of things like existence value, option value, national brand value, recreational and aesthetic values, and so on. In practice, a large component of informed judgment is required about qualitative issues and non-marketed values. Economists have to be keenly aware of the point at which their professional expertise runs out and judgment from mandated decision makers is required.

One important way in which non-quantifiables can be efficiently and appropriately given their due weight is the classification of a country's land area according to the importance of conservation values in each area, with a correspondingly ascending scale of degrees of protection from mining and other activities that deplete conservation values. The establishment of schedule 4 of the Crown Minerals Act 1991 by amendment in 1997 is a case in point. Schedule 4 is best seen as a device to reduce regulatory uncertainty, and avoid the waste of scarce resources on complex consenting and cost-benefit processes, by the simple transaction-cost-minimising device of removing the highest-value categories of land from consideration for mining. Its effectiveness in performing that role, unfortunately, relies on the credibility of the protection afforded. Regulatory uncertainty, and its potentially chilling effect on investment in general, is only increased when industry lobbies see real opportunities to overturn institutions and rules rather than to work within them. This has turned out to be the case with schedule 4 because of the weakness of the protection provided by the legislation, which gives two ministers unfettered discretion to remove areas from the schedule by order in council, following a consultation process that might easily be reduced to tokenism. An important lesson from the 2010 debates is that, at the very least, removal of schedule 4 protection from any piece of land ought to require a parliamentary vote, and the Crown Minerals Act ought to be amended accordingly.

While the sort of absolute prohibition on mining provided by schedule 4 is appropriate for the very highest-value categories of conservation land, there is also scope for a clearly-defined filter to be applied to any project proposed in lower-valued areas of the conservation estate, prior to setting in motion the RMA machinery and detailed cost-benefit assessments. Such a filter is provided for non-mining activities by s17U(3) of the Conservation Act 1987, which prevents the minister of conservation from granting any application for a concession that is 'contrary to the … purposes for which the land concerned is held'. This preliminary filter, which requires in effect that only projects that do not encroach unduly on key conservation values can proceed, ought to apply also to any mining project proposed for any part of the conservation estate. Ideally this would be achieved by repeal of s17O(3) of the Conservation Act (which exempts mining from the standard test applied to all other sectors except non-consumptive tourism and recreation). Miners would then have to apply for concessions on the same footing as other sectors. Once a project has been declared to be consistent with the reasonable protection of non-quantifiable values, the quantifiable elements of cost-benefit analysis would come into their own.

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Bearing that in mind, in the remainder of this article I shall quickly review some areas in which back-of-envelope quantitative calculation may provide some useful insights into the role that mining projects could be expected to play in the New Zealand economy. I focus on mining sectors other than oil and gas, since it is these that are most relevant when looking at the conservation estate.

What are schedule 4 minerals actually worth?

One straightforward cost-benefit shortcut is a threshold test: using whatever quantitative data are available, estimate the cash price that a mining developer might offer for the resource and ask whether this would compensate adequately for the sacrifice of whatever non-market and unquantified values may be at risk. If the price seems reasonable in the eyes of whatever constituency determines the outcome, then the project could proceed; if not, not. This is not a full cost-benefit appraisal, simply a screening device.

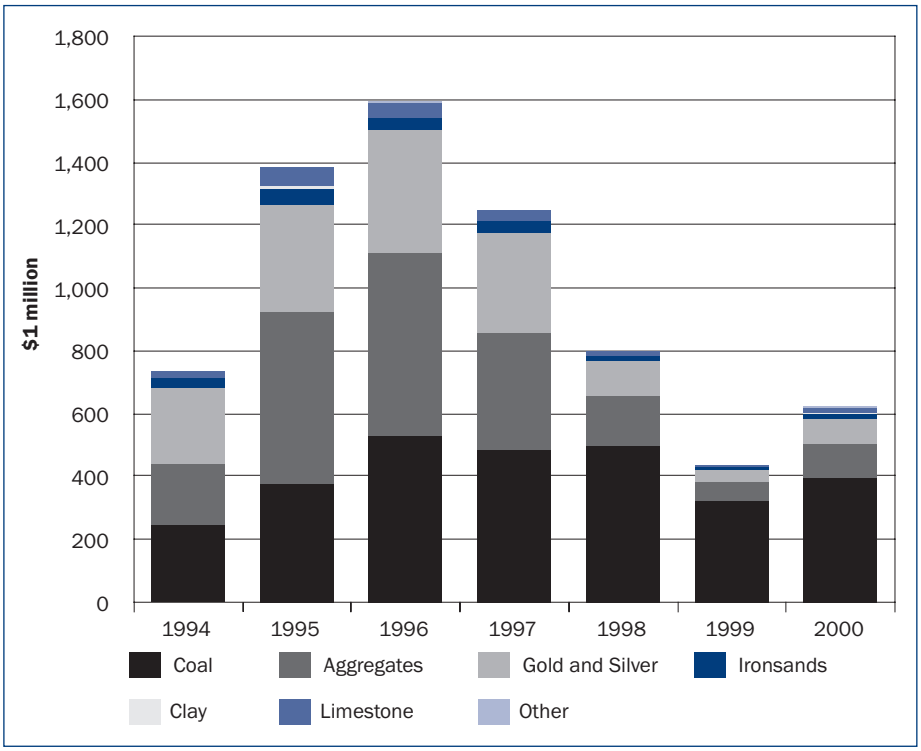
I argue that something of this sort happened implicitly in the course of 2010. The government (1) published its proposal for mining to be allowed in schedule 4 lands, (2) put out some (very limited) information on the extent of mineral deposits in those lands (Ministry of Economic Development, 2010), (3) invited public submissions, and then (4) in the end withdrew the proposal in the face of a storm of public criticism. In so far as public opinion was correctly represented by the protests, submissions and final decision, it boiled down to a general feeling that the losses would outweigh the gains, on the limited information available.

The only actual dollar number provided in the government's discussion document was a figure of $194 billion, described as 'an estimate of the value of New Zealand's on-shore minerals, excluding hydro-carbons' (ibid., p.2). From an economist's point of view this figure is in no sense the value of the resource; it is simply an estimate of gross revenue from its full extraction. Elementary economics requires the subtraction of the relevant costs (of exploration, development, extraction, processing, marketing, transportation, site rehabilitation and so on) to arrive at an estimate of the net income that the resource could yield – the sum generally referred to as 'resource rent'. This is the return that the New Zealand public, as owners of subsoil minerals (through the Crown), could secure from a perfectly-designed royalty on mining operations.[3] In present-valued form it is the lump sum that the country could expect to receive by selling off, to the highest bidder, the unlimited right to mine all on-shore non-oil minerals.

In 2002 and 2003 Statistics New Zealand released estimates of this rental value of New Zealand's mineral estate (Statistics New Zealand, 2002, 2003, table 5.1, p.16), using essentially the same physical inventory of mineral deposits as the 2010 Ministry of Economic Development (MED) discussion document on schedule 4. The estimates showed very great sensitivity to commodity price movements (see Figure 1),[4] but the order of magnitude is clear: less than a $2 billion lump-sum valuation for the entire mineral estate, which means resource rentals run below 1% of the MED's gross sales revenue figure.

The mineral reserves listed in the parts of schedule 4 covered by the MED's March 2010 stocktake were 10% of the New Zealand total, implying that in total they would sell for substantially less than $200 million. With 2.8 million voters, that converts to a price for sacrificing the highest-valued corners of the conservation estate consisting of a one-off payment of less than $70 per voter. If the rough mid-point value in Figure 1 is used – $1 billion – the price offered per voter would be $35. If all of schedule 4 were opened up without restriction to mining, the mining rights to this 40% of New Zealand's total minerals endowment would fetch $400 million, or $143 per voter. The public's instinctive estimation of the balance of costs and benefits, and rejection of the March 2010 proposals, looks well-founded.

Figure 1: Monetary Value of New Zealand Mineral Stocks Excluding Petroleum



Income distribution and employment vary widely by detailed sector

One important piece of quantitative information that was missing from the official information during the 2010 debates is the extent to which different types of mining have different economic structures, and hence different impacts on the wider economy. The national accounts show only highly-aggregated figures for all mining lumped together, and Statistics New Zealand does not produce disaggregated figures on grounds of 'commercial confidentiality'. The effect of this secrecy is to conceal information that would be essential for proper public scrutiny of mining policy. Gold and silver mining, central to the 2010 debates, represents only 20% of the value of output in the mining and quarrying sector, even with oil and gas excluded. The dominant non-petroleum mine products are coal (40%) and quarry products such as gravel, rock and sand (35%). Quarrying and coal mining are predominantly New Zealand-owned, and quarrying incudes a large number of small- and medium-scale operations accounting for much of the sector's employment. Hiding gold and silver behind those other activities in the statistics is a disservice to good policy making.

Fortunately, there is enough information scattered around the public arena to enable estimated accounts to be constructed for five mining subsectors: quarrying, coal, ironsands, gold and silver, and services to mining. (My accounts for

the last of these contain residual entries to reconcile with the aggregated national accounts, hence are particularly subject to errors and omissions and are excluded from Figures 2 and 3.)

Figures 2 and 3 set out the results of this exercise, showing the breakdowns of gross output and gross value added amongst the various distributional categories.[5] The bars are presented at successively greater levels of disaggregation. On the left of both charts is a bar for the New Zealand economy overall; then a bar for all mining combined (including oil and gas). Then the aggregate mining sector is divided between oil and gas and other mining. Finally, the disaggregation of other mining is carried through to ANSIC level 3.

The differences are significant. For both the New Zealand economy and mining as a whole, gross value added (the part of output not taken up by payments for intermediate purchases) was about 45% of output; lower for coal and quarrying, higher for oil and gas and gold and silver. Of the gross value added, depreciation (really a form of intermediate purchase, since it represents consumption of fixed capital, not a return to capital) took 15% of gross value added for the economy as a whole compared with 26% for mining, but within mining there was a dramatic range, from 4% for ironsands to 45% for gold and silver. Net operating surplus (profit and rent going to the owners of the businesses) was one-third of gross value added for the economy as a whole compared with 48% for mining; within mining, the share ranged from 31% for gold and silver to 50% for oil and gas. These figures highlight the capital-intensive nature of mining in general and gold and silver mining in particular.

The very high depreciation share in gold and silver implies low company income tax, given the generous tax deductions provided to mining; sure enough, income taxes and royalties combined were only 4.4% of total output and 8.3% of value added for gold and silver mining in 2007, about 25% of net operating surplus. The only mining sector with lower tax payments than precious metals was ironsands, where tax losses carried forward from previous years meant no company tax was paid at all, and royalties took a mere 0.1% of gross output value.

The high capital share of income and low effective tax rates translate to high rates of leakage of income from the New Zealand economy, given the almost complete offshore ownership of ironsands and gold and silver mining, and substantial overseas ownership in oil and gas. Figure 4 indicates that overseas ownership accounts for 35–40% of the mining sector's net capital stock (the remarkably high 2003 and 2004 figures are almost certainly an error by Statistics New Zealand).

The counterpart to high capital shares of income is a low wage and salary share in key mining sectors. Across the New Zealand economy as a whole, compensation of employees claims 47% of value added, whereas for mining as a whole the wage share is 21% – less than half. Again, there are wide variations. Ironsands in my estimated accounts has a

Figure 2: Distribution of Gross Output by Detailed Mining Sector, 2007

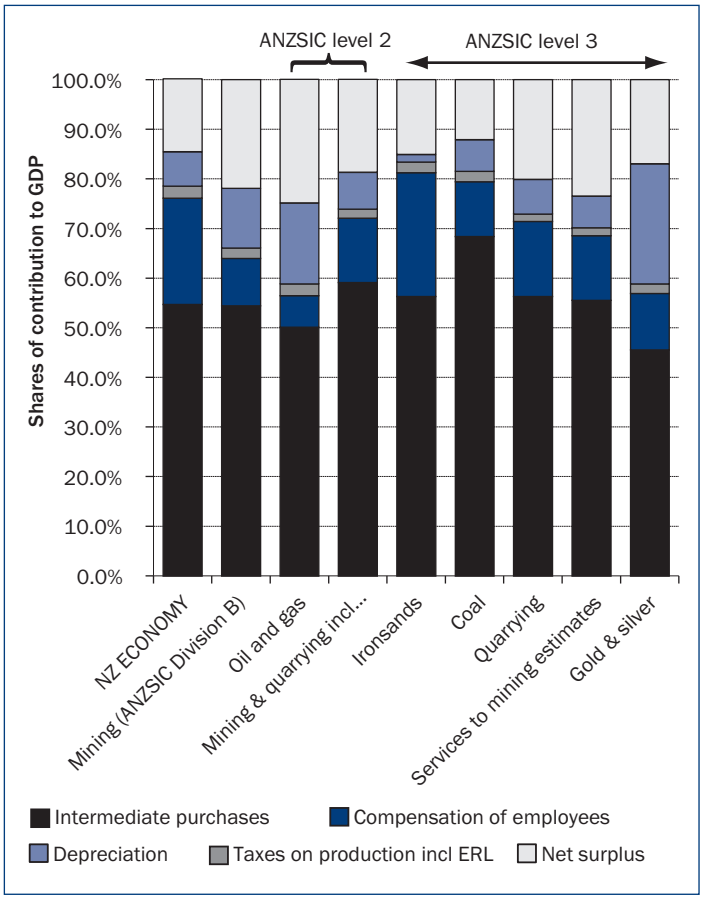
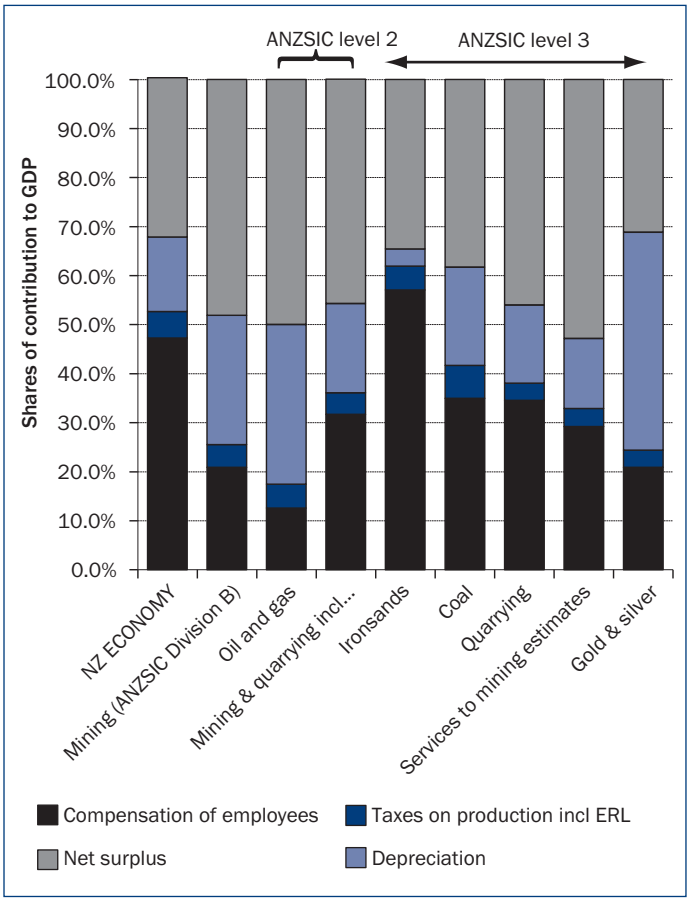


Figure 3: Distribution of Gross Value Added by Detailed Mining Sector, 2007



wage share of about 57%; quarrying and coal has 35%, gold and silver 21% and oil and gas 13%. The sector as a whole is not a strong employment or wage-income generator, and of the non-oil mining activities gold and silver are clearly the weakest on this score. This is consistent with the observation that mining as a whole accounts for roughly 1% of GDP but only 0.3% of the economy's employment. Also unsurprising is that coal mining and quarrying between them account for over two-thirds of the mining sector's total employment.

Foreign exchange contribution

A question often asked when assessing the economic contribution a sector's expansion could make is how much it contributes to the nation's balance of payments. There are two elements in this. First is the net foreign-exchange impact of direct receipts (from export earnings) and payments (for imported intermediates, depreciation of foreign-owned capital and profit accruing offshore). This calculation yields, for 2007, the grey bars in Figure 5. Second is the overall contribution, including import savings (the amount that would have had to be paid to import the mining products supplied to the local economy if the domestic mining sector were not here). This direct and indirect total impact is shown in the dark blue on the right in Figure 5. The outstanding contributor is quarrying, because of the very high transport costs per tonne that would have to be paid to import the gravel, stone and sand supplied to local construction, cement manufacture and roading. The least strong contributor is gold and silver, with a direct contribution of 49% of gross sales revenue and a direct and indirect combined impact of 55%.[6]

Figure 4: Overseas Investment in Mining Compared with Mining Net Capital Stock

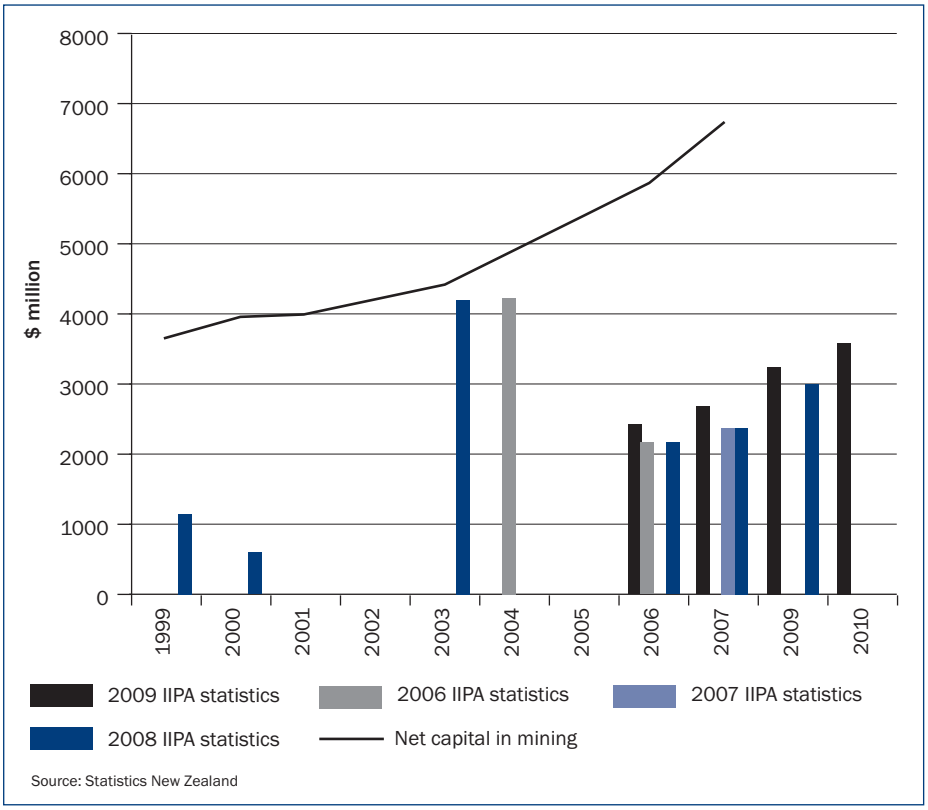
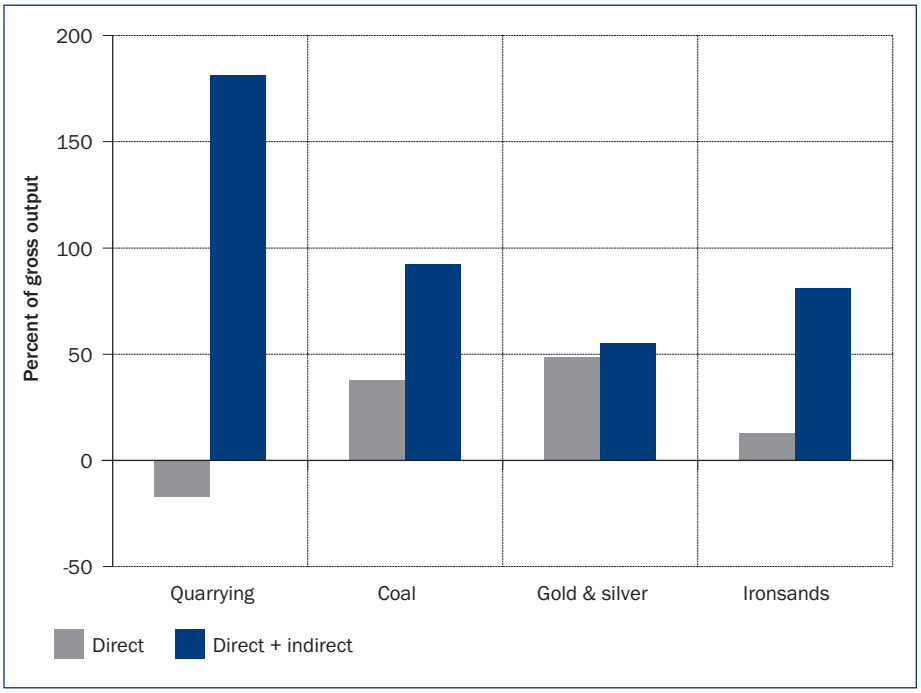


Figure 5: Direct and Indirect Foreign Exchange Contribution as % of Gross Output



Contingent liabilities

The direct environmental damage caused by mining – especially via open-cut pits and large tailings dams – often has to be remedied by expensive engineering work after mining ceases, and it is only recently that these contingent liabilities have been taken seriously by New Zealand policy makers (prior to the 1991 mining legislation, mining companies could simply walk away, leaving their sites as orphans to be cleaned up at taxpayer expense). It is now customary for cash bonds to be required as part of the RMA process, but the amounts of the bonds remain insufficient to cover all contingent liabilities, which means heavy reliance is placed on the goodwill of companies to remedy major damage on their own account. Of four major mines in the Hauraki-Coromandel area since the 1960s, two (Tui and Golden Cross) have had tailings containment failures and one (Martha Hill) had subsidence, damaging properties in the township. The Tui clean-up will cost taxpayers over $20 million. Golden Cross tailings-dam remediation cost the owners somewhere between $30 and $60 million. Non-compliance with RMA consent conditions, especially in

relation to waterways pollution, is still a recurrent feature of the industry, especially on the West Coast. Combined with the boom-and-bust cycle of world prices for mining outputs, this means that mining is a relatively high-risk activity and this needs to be factored in to any cost-benefit assessments of mining projects.

Spillovers

Spillovers (externalities) from mining in the conservation estate come in two sets. The most obvious are the largely unquantifiable detriments to the existence values of landscapes and ecosystems, which impact negatively on non-consumptive uses such as recreation, tourism, photography and film, and the vicarious enjoyment of the New Zealand outdoor environment by people who may never visit the relevant places in person. Existence values are no less real than commercial values, and it is not helpful to dismiss them as 'emotion', since human welfare is ultimately experienced as happiness by individuals and it is this that economics seeks to maximise. Given the difficulties of quantification, the provisions of the Conservation Act discussed earlier and the existence of schedule 4 of the Crown Minerals Act provide a reasonably effective way of ensuring that these spillovers are accounted for in policy decisions.

The second set of spillovers are more susceptible of quantification: negative impacts on other sectors of the economy due to factors such as damage to the nation's brand image as 'clean and green' or '100% pure'. Two major studies in the early 2000s analysed the economic impact of a major negative shock to New Zealand's brand image and estimated that environmental degradation, or policies perceived as anti-environment, could reduce overseas tourism by a large amount (over half in one study, rather less in the other) (PA Consulting Group, 2001; Sanderson et al., 2003). Because of tourism's large weight in GDP, the negative GDP impact of a loss of brand image could easily be 1–2%. This would be a big spillover effect.

Whether any particular mining project would have an impact of this sort on the national branding is highly uncertain. Some might, many probably would not. Recognition of the possibility, however, emphasises the need for policy on mining development to be framed, and suitable for presentation, in 'clean–green' brand-friendly terms. The body language of government ministers in early 2010, with muscular statements criticising the restrictions imposed by existing environmental law, were ill-judged from this point of view.

1 Notable examples were the National Development Act 1979 and the Clutha Development (Clyde Dam) Empowering Act 1982.

2 A good example of 'boosterism' by mining industry consultants is Layton et al. (2010), which traces the positive economy-wide effects of two hypothesised windfall mineral projects, both of which were simply assumed (with the assumptions left implicit, not explicit) to incur no environmental or other non-marketed costs, and to spring into being without any market incentives being required to trigger the required investments.

3 Proposals in Australia to impose a resource rental tax on large mining companies represent a step towards such a well-designed royalty regime, and recognition that the prevailing tax system in that country has failed effectively to capture mining resource rents. For the Henry Tax Review discussion of the issues see http://taxreview.treasury.gov.au/content/Content.aspx?doc=html/pubs_reports.htm, part 2, volume 1, chapter C.

4 For each year in Figure 1 the asset value of the mineral estate at 31 March is estimated, using the mineral commodity prices prevailing at that time. Year-to-year changes in the valuation are driven almost entirely by price changes, with a very minor role for actual discoveries and depletion during the preceding year.

5 I am grateful to Forest & Bird, for whom the research was undertaken, for permission to reproduce these charts. For the full dataset and accounts see Bertram (2010).

6 The minister of energy, Gerry Brownlee, in July 2010 used on TV3 a figure of 91% for the balance-of-payments contribution of gold and silver mining. In response to a parliamentary question asking the minister for his source, his reply, on 11 August 2010, was that 'According to www.anotherview.co.nz Newmont Waihi Gold's mining operations in 2009 generated a total revenue of $193.7M, 91% of which the website advises remained in New Zealand'. The news item cited on the website was Chris Rennie, 'Overseas firms spend big in New Zealand', *Press*, 26 May 2010. On inspection, it turned out that the article had (1) credited all intermediate purchases as local expenditure (overlooking the import content of intermediate purchases), (2) treated depreciation as a payment within New Zealand, and (3) treated all profits not immediately distributed as dividends as having been spent within New Zealand. The extent of repeated government reliance on unreliable figures from non-official sources has been probably the most alarming element in the 2010 public debates.

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