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# Special Taxation of the Mining Industry

by

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## 1. Introduction

The mining industry in Australia, and in most other countries, pay special taxes for the use of community owned resources in additional to taxes levied on businesses in general. General taxes include the corporate income tax, payroll and transaction taxes, and labour pay personal income taxes. In the states and territories the additional tax in most cases takes the form of a royalty levied as a tax on production, either as a specific tax per unit of production or as an ad valorem percentage of the value per unit mined. Details are in The Treasury (2008). In the case of offshore energy resources, the commonwealth imposes a special tax either as a royalty or as the petroleum resource rent tax (PRRT) (The Treasury, 2008).

Adopting one of the recommendations of the review of Australia's Future Tax System (Henry, et al., 2009), in May 2010 the commonwealth proposed replacing the royalties from July 2012 with a version of a resource rent tax which it called a resource super profits tax (RSPT) (Australian Government, 2010). In July 2010 the RSPT proposal was dropped and replaced with a proposal to extend the PPRRT to on-shore and all off-shore oil and gas, a modified resource rent tax called the mining resource rent tax (MRRT) to apply to iron ore and coal, and retention of current royalties for all other minerals (Gillard, et al., 2010). In addition to replacing the royalty system, a portion of the revenue collected from the new special mining taxes is tagged to fund a tax mix change, including a reduction in the corporate tax rate.

This paper considers: the efficiency and equity arguments for a resource rent tax which is expected to collect over time more revenue than the to be replaced royalties; options and issues in the measurement of the economic rent; and, some

of the important practical issues associated with adoption of the proposed resource rent taxes[1].

The rest of the paper is organised as follows. Section 2 provides a background context. It includes details of the mining industry which can result in economic rents, and details of current taxation, both general taxation and special additional taxes on mining. Efficiency and equity arguments for special additional taxation of the economic rents earned by the mining industry are presented in Section 3. As argued by Brown (1948), Garnaut and Clunnies-Ross (1975), Emerson and Lloyd (1983) and more recently Daniel et al. (2010) among others, taxing the economic rent is a more efficient replacement for the current royalty system. Also, the new tax is to fund a reduction of the corporate income tax rate falling on more internationally mobile capital as proposed in the review of Australia's Future Tax System (AFTS) (Henry, et al., 2009),[2] and as an equity argument. Options for the measurement of economic rent are described and compared in Section 4. The options include the expenditure base or Brown tax, the resource rent tax which lies behind the PRRT and MRRT, and the proposed SPRT. These tax bases also are compared with the current corporate income tax base. The taxes as an ex poste measure are compared with the ex ante option of collecting the economic rent from mining via an open tender bidding auction for the property rights to mine a particular deposit. Section 5 considers some important practical issues that arise with the implementation of the RSPT. These include, the treatment of existing mines, sovereign risk, and commonwealth-state financial arrangements which are affected by the shift from a state based royalty system to a commonwealth resource rent tax. A final section draws together some conclusions.

[1] Many of the same issues are considered in the more technical paper by Smith (2010). There are some differences of areas of emphasis, and even some disagreement over some details, between the two papers.

[2] Note that contrary to the AFTS proposal to use any revenue windfall to fund a reduction in the taxation of more internationally mobile factors of production, and in particular a lower corporate income tax rate, the government proposal is to use only some of the revenue windfall for a tax mix change. A portion of the revenue gain is to be allocated to an infrastructure investment fund and to fund lower net PAYG tax collected in switching a further share of labour remuneration from wages and salaries to a three percentage point increase in the compulsory superannuation levy, with the later not recommended in AFTS.

2. Mining Industry Context

Important distinguishing characteristics of the mining of minerals and energy generate economic rents. Unlike the services and manufacturing sectors, the mining industry requires significant natural resource inputs as well as capital, labour and management inputs.

Capital, labour and management are mobile across the different sectors of the economy, and some are mobile across the global economy. Returns to the mobile inputs allocated to the mining industry, at least at the margin, equate with returns to these inputs in other sectors of the economy. In effect, their cost to the mining sector represents their opportunity returns of employment in other sectors. By contrast, natural resource inputs are, like land, geographically immobile and fixed in supply. Economic or scarcity rents earned on a particular deposit, or parcel of land, are specific to a particular location and are not mobile within a country or across the globe. The diverse range of attributes of different particular mineral and energy deposits, and their geographic specificity, resultss in the more favoured deposits generating economic rents.

Importantly for the taxation of the mining industry, tThe magnitudes of the economic rent vary from one mine or energy site to the next. Relatively low cost mines and wells have a combination of low exploration and mine-specific technology development costs with, large and rich endowments of the desired mineral or energy product. Other factors affecting economic rent include whether, the mine is close to appropriate infrastructure with excess capacity, and there are relatively low cost challenges regarding the environment and heritage values affected by the mine. In the context of a particular mining product, these are inframarginal mines on the low part of the social opportunity cost curve.

At the other extreme, there are marginal mines, or zones of extended mine life and production, with a combination of higher exploration and technical development costs, smaller and poorer desired mineral and energy endowments, they require

more expensive outlays on labour, capital and management inputs extraction methods, they require large complementary investments in transport infrastructure, and they face greater challenges in terms of environmental amenity and heritage values alternative uses of the site. The importance of the different natural resource attributes of different mines and wells within a particular industry, unlike the story for most of the services and manufacturing sectors of the economy, results in a supply curve reflecting the social opportunity cost of labour, capital and management inputs which is upward sloping and far from perfectly elastic.

The geographical fixity of supply of natural resources explains why many mining and energy projects are located in unfavourable places in terms of the availability and cost of mobile labour, capital, management and materials. Economic rents, or returns above the social opportunity cost of allocating labour, capital and management resources away from other sectors of the economy, are generated for the lower cost attribute favoured mines and wells, but not for the higher cost and poorer natural attribute sites.

Executives of mining industries have in front of their desks graphs showing the ranking of mines or wells in their industry (globally as well as within Australia) by cash and accounting cost per unit of output (see, for example, summary graphs in Daley and Edis, 2010, and references therein). For the main minerals, including iron ore, bauxite, copper and coal, and for oil and gas wells, it is not uncommon for the bottom quartile cost mines to operate at a half or less of the cost of the upper quartile cost units. With highly competitive industry structures in a global market setting a price that just covers the costs of the marginal mine, economic rents are created for the inframarginal mines. This rent is greater the more favoured is the natural endowment of the mine.

In the case of building materials such as clays and sands, it is likely that the cost differences between the more favoured and less favoured deposits are relatively

small. As a result, the long run supply function for these minerals is highly elastic and relatively small economic rents are available on the inframarginal mines. This reasoning, together with the higher operating costs of a economic rent tax relative to a royalty, lies behind the proposal in AFTS (Henry, et al., 2009) to not apply a resource rent tax to these mining industries. In fact, there would be little rent to tax. Rather than a measure to capture rents, the current royalty for many of these mines may be more in the form of a proxy measure of the alternative value of the site for urban development, agriculture or a nature reserve.

Most of the services and manufacturing sectors of the economy, in contrast with the mining sector, have a high dependence on economy-wide, if not global, mobile labour, capital, management and materials inputs, and a small dependence on natural resource inputs. With approximate constant returns to scale technology, the long run supply curves for most services and manufactured products are close to perfectly elastic. This does not rule out economic rents associated with monopoly market power and quasi-rents for initial successful investments in technology and market development.

An important characteristic of the mining production industry in modern Australia is its high capital cost intensity. In most cases, scale economies and mine lives of at least several decades require up-front investments of hundreds of millions of dollars, and in some cases billions of dollars. Most of the capital cost becomes a sunk cost. For older established mines, repairs and maintenance costs often are non-trivial, and significant investment sums can be involved in extending the life of the mine and in bringing more marginal deposits into production. An important implication of the high capital intensity of the mining industry and long time lags between investment and production for the structure of, and the different measures of, economic rents to be discussed in Section 4 below is the large negative cash flows for several years following a large investment, either for a new mine or for a significant extension of mine life.

Another important implication of the cost structure of the mining industry is the relatively low elasticity of supply in the short run of up to several years. In response to a perceived longer run increase in demand, it takes several years for investment in expanded capacity to increase production. In the event of a shift inwards of demand, with large sunk costs and relatively low short run marginal costs, market price has to fall a long way before shutting down or closing a mine. A result of the inelastic short run supply curve against shifts in demand is volatility of world prices for most mining and energy products (see, for example, ABARE, 2010). In turn, both economic rents and corporate profits are volatile from year to year.

Mining is characterised by much uncertainty. There is imperfect knowledge about the quality and quantity of exploitable minerals and energy, and about future technology, input costs, output prices, and often government taxation, environmental and other policies. Different players have different sets of knowledge and expectations. Government also faces imperfect knowledge of the information held by different miners.*Counterarguments*

Some economists reject the notion of economic rent, or claim that the concept is not applicable to the mining sector.

Davidson (2010)

http://www.ipa.org.au/news/2115/rudd%27s-other-great-big-new-tax

asserts that the concept of rent 'origin in the labour theory of value' and that 'Economic rent is a construct of a failed economic theory.' The first claim seems entirely wrong: the classical theory of rent was entirely consistent with the neoclassical theory of marginal productivity, which replaced the labour theory of value. As Davidson implicitly concedes, the concept of rent is a standard feature of neoclassical textbooks from Alfred Marshall to the present day: presumably the failed economic theory to which Davidson refers is mainstream economics. Davidson correctly asserts that 'The idea that economic value exists independent

of markets, human ingenuity and entrepreneurship is simply wrong'. It is, indeed, obvious that a deposit of, say, iron ore is worthless in the absence of the various technologies humans have developed for extracting, refining and using iron, and of the markets in which iron ore and iron products are traded. But the rent associated with rights to mine a particular deposit does not accrue to the creators of those technologies and markets, but to the mining companies that hold a particular right.

Theoretical arguments can be carried on indefinitely, but the mining industry presents a clear empirical test of claims like Davidson's. If these claims were true, mining activity, like other forms of activity, would be located primarily in jurisdictions which promoted markets, and rewarded human ingenuity and entrepreneurship, that is, in highly developed market economies. In reality, however, much mining activity is undertaken under highly unfavourable political and economic conditions.

The geographical fixity of supply of natural resources explains why many mining and energy projects are located in unfavourable places in terms of the availability and cost of mobile labour, capital, management and materials. Economic rents, or returns above the social opportunity cost of allocating labour, capital and management resources away from other sectors of the economy, are generated by the existence of highly prospective mineral deposits

In this context, it is useful to consider the claims of opponents of the resource rent tax who claimed, on the one hand, that mining activity is highly sensitive to concerns about 'sovereign risk' (broadly defined to include any policy change deemed unfavourable to the sector) and, on the other hand, that the tax would lead miners to relocate to Africa. Given the high levels of political instability in most African countries, such claims are self-contradictorty http://keepminingstrong.posterous.com/the-true-cost-of-the-rspt.

A second set of arguments concern uncertainty. Mining is characterised by much

uncertainty. There is imperfect knowledge about the quality and quantity of exploitable minerals and energy, and about future technology, input costs, output prices, and often government taxation, environmental and other policies. Different players have different sets of knowledge and expectations. Government also faces imperfect knowledge of the information held by different miners.
It follows that the effects of any taxation system will differ from those of the textbook analysis based on the assumption of perfect information.

In particular, since exploration costs are measured with error, a tax designed to fall on rent (revenue less costs less normal return to capital) must to some extent reduce the return to exploration. Thus, as Davidson argues, the textbook conclusion that a tax on rent has no effect on resource allocation must be qualified when uncertainty is taken into account.
But this is true of all taxes and indeed of all economic policies. No policy works exactly as a textbook analysis suggests, but economists have not, in general, drawn Davidson's conclusion that the economic theory is useless as a guide to public policy.

**Tax policy and the mining sector**

The mining industry is treated similarly to other industries in the economy in terms of general taxes, including income taxation, the GST, payroll tax, state transaction taxes, and so forth[3]. Apart from the immediate expensing of outlays on exploration, which is similar to the expensing of most R&D outlays, the mining income tax base is close to a comprehensive income tax base[4]. For example, there are no significant other tax expenditures (The Treasury, 2010). Then, the effective income tax rate on mining is close to the statutory 30 per cent corporate tax rate.

[3] Since the GST, payroll, transaction and other taxes are not to change under the May 2010 and July 2010 announced reforms, they are not considered further. However, AFTS does propose changes to these taxes.
[4] Under a pure income tax base, if the exploration is successful it should be depreciated over the life of the mining project, and only if it is unsuccessful should it be expensed. Making such a distinction is difficult and costly in practice, and most income tax systems in practice err in favour of expensing. Perhaps there is some support to compensate external benefits to other miners of exploration.

Under the imputation system, corporate tax paid is a withholding tax for the income earned on equity investments by shareholders distributed as dividends, and it is a flat rate tax on retained earnings which flow onto capital gains, which in turn receive concessions at the shareholder level. Interest on debt finance is deductible to the mining producer, and taxable for the saver. Then, economic rents earned on mining projects with relatively favourable natural endowments, or in times of commodity booms, are taxed at about the statutory rate of 30 per cent.

The Treasury Architecture paper (The Treasury, 2008) describes a complex array of different special taxes levied on the mining industry[5]. For off shore oil and gas projects the commonwealth imposes a PRRT, as a form of resource rent tax, on all projects except the North West Shelf. The PRRT is levied at a 40 per cent rate on a measure of cash flow, but with losses carried forward and indexed by an uplift factor of the long term bond rate plus 15 per cent for exploration and plus 5 per cent for development and operating expenditures, but no refunds for losses. Excise on North West Shelf energy faces a progressive rate schedule with a top rate of 10 to 12.5 per cent of the well head value. The states have over 60 different sets of special taxes on on-shore mining investments. Most are ad valorem rates, with a few specific taxes, and in the NT a profit based tax is levied. The ad valorem rates vary from zero (for Victorian gold), around 7 per cent (for NSW and QLD coal up to $100/t and WA iron ore) and up to 10 per cent (for QLD coal above $100/t). The NT profit based tax on economic rents is 18 per cent. The Australian Government (2010, page 11) estimate

"The effective resource charge (charges as a percentage of super profits earned) has almost halved from an average of around 34 per cent over the first half of this decade to less than 14 per cent in 2008-09.".

Over this period, the RBA index of non-rural commodity prices jumped from around 40 to over 100 (Reserve Bank of Australia, 2010).

[5] Of interest is a comparison of the royalties for 2006-07 in the Treasury (2008) with those for 1978-79 in Emerson and Lloyd (1983). In particular, as well as the diversity of rates across the different minerals and states in both periods, there has been a marked shift from specific royalties to ad valorem royalties over time.

In all cases the special and additional taxes on the mining industry have been a deduction as a user fee for the state owned natural resources in measuring taxable corporate income.

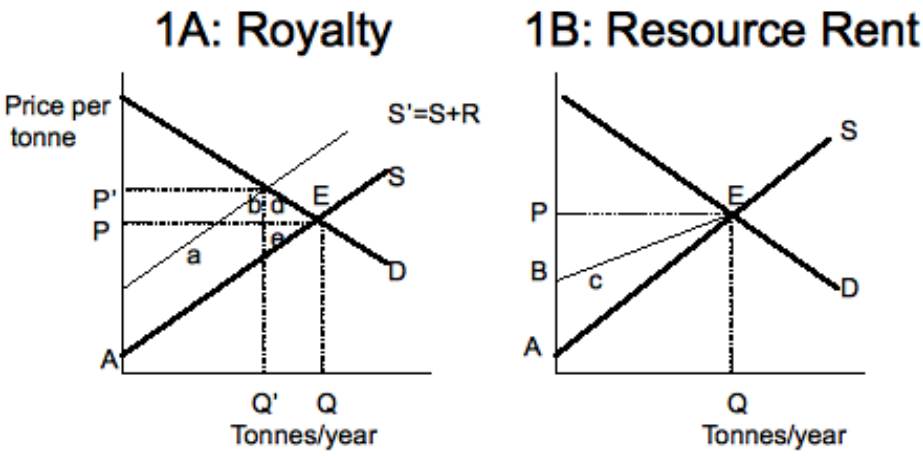
3. Arguments for Change

This section explores the efficiency and equity arguments for using an economic rent base tax to replace the current royalty system and to fund a reduction in the corporate income tax rate.

For a long run perspective, Figure 1 explains the key differences between the operation and market outcome effects of the royalty system and an economic resource rent tax. It illustrates also the efficiency argument for replacing the royalty system[6]. A less than perfectly elastic supply curve S reflects the social opportunity cost required to entice labour, capital, management and materials from the rest of the economy. As argued in the preceding section, it is upward sloping to reflect that some mines and wells have more favourable endowment attributes than other mines and wells. The elasticity will vary from one product to another. A downward sloping demand curve D represents the world excess demand plus domestic demand for the Australian product. For some products in will be close to perfectly elastic. In the absence of special taxes on the mining industry, output is at Q and price P. The triangle PEA provides a measure of the economic rent to the natural resource (and more on its measurement in Section 4 below). In the absence of market failures for the industry, and second best considerations, the P and Q outcome is an efficient one.

[6] Hogan (2007, Section 3) provides extensions to Figure 1 in the form of making specific additions to the long run cost of risk premiums for risk averse decision makers and tax operating costs, and then allowing for the royalty and profit based special taxes to have different implications for these specific cost items.

# Figure 1: Comparison of Royalty and Resource Rent Taxes




Consider now the effects of the two special mining industry tax options. Figure 1A shows the effects of a royalty. The tax per unit of output R shifts the supply curve upwards from S to S' = S + R. At the new equilibrium, output falls to Q', price rises to P', royalty revenue is a + b, producers lose some economic rent, and there is an efficiency cost of d + e from too little production. Figure 1B shows the effects of a resource rent tax at rate BA/PA which collects government revenue of c. Relative to the efficient pre-tax outcomes, output and price remain unchanged, and there is no efficiency loss. Producers lose a share of the economic rent. In fact, an approximate government revenue neutral swap of a resource rent tax for the current royalties would leave producers as an aggregate better off. However, mines with particularly favourable natural attributes on the bottom of the cost curve will pay more special tax while those with less favourable attributes will pay less special tax, and the marginal investments no special tax. Then, subject to the within the mining industry producer rent redistribution proviso, an approximate revenue neutral replacement of the royalty system with a resource rent tax represents a Pareto improvement.

Comparative effects of shifts of demand and the resulting fluctuations of commodity prices on the special taxes collected from the mining industry with a royalty versus a resource rent tax also can be assessed from Figure 1. Given the low elasticity of supply in the short run, with the specific royalty the special tax collection remains fairly constant during miningcommodity booms and slumps, and producers bear most of the fluctuation in returns. By contrast, with a resource rent tax, the windfall gains and losses with commodity cycle and other fluctuations in mineral and energy prices are shared between the government and producers. An ad valorem royalty redistributes a smaller share of price fluctuations to the government because of the lower tax rate relative to the economic rent tax rate. Since the corporate income tax revenue also moves pro-cyclically with commodity booms and slopes, the aggregate special tax plus corporate tax fluctuation is modified towards a middle position for the optional special taxes. But, the resource rent tax option, relative to the royalty, still smooths after tax income and reduces the risks for the miner, and it increases volatility of aggregate taxation revenue, relative to the royalty system. These properties also favour greater stability and credibility over time of the resource rent tax as circumstances change.

Efficiency of the allocation of resources within the mining industry between different products and across the different states would increase with harmonisation of the special tax, either the royalty or the resource rent tax. If the commodity cycle of the past decade is an example of the future, using Treasury numbers (Australian Government, 2010, page 11), a replacement resource rent tax with a rate of around 20 to 25 per cent would on average across all mining and energy products offset the revenue collected under the current set of variable rate royalties[7]. The resulting aggregate revenue neutral over time set of special taxation of the industry would lead to a more efficient pattern of investment and production across different products within the mining industry.

[7] Arguably the 2000 through 2009 decade of commodity prices has been above the long term trend with no price slumps of the depths of the early 1980s and late 1990s

The government proposed reforms are expected on average and over time to collect much more revenue than the replaced royalties. As argued in AFTS (Henry, et al., 2009), this is a part of an approximate constant aggregate revenue tax reform package to change the tax mix away from internationally mobile factors, and in particular capital, and onto immobile factors, and in particular land and natural resources. Specifically, AFTS recommended some to all of the resource rent tax revenue be used to reduce the corporate income tax rate[8]. Next, we consider the efficiency and equity arguments for such a tax mix change.

The efficiency argument for a tax mix change is as follows. As argued in Figure 1B, higher taxation of the economic rent earned on the immobile factors has little effect on the quantity employed of these factors, or on the market price. Its principal effect is redistribution of the economic rent between the mine operator and government. By contrast, source taxation of mobile factors, and in particular corporate taxation of capital income, has a large effect on the quantity of capital employed in Australia, and most of the economic incidence of such taxes is passed back to the immobile factors. For Australia as a small open economy, the supply curve for international capital combined with the ability of domestic savers to invest in Australia or overseas, results in a highly elastic supply of capital to Australian investors. Then, Ffor example, higher effective taxes on capital income on investments in Australia against a fixed required world rate of return after Australian taxes forces an increase in the required pre-tax return on Australian investments. After some time, the reduced investment results in less capital per worker and per mine[9], a fall in labour productivity, and ultimately a fall in real wages and rents. Conversely, a reduction in Australian taxes on domestic investment ultimately would increase the Australian capital stock and be passed

[8] The government proposed package does not follow the AFTS proposal to use all the revenue to fund a lower corporate tax rate. In its proposal, while the gains to non-mining industry shareholders will be less than noted here, the list of winners includes the direct and indirect beneficiaries of the additional government outlays on the infrastructure fund and the tax concessions for the extra superannuation.

[9] The change in the quantum of capital in addition is likely to change in the same direction technology and knowledge spill over benefits embodied in the capital, and all three ~~which~~ are important contributors to productivity growth.

on as a higher real wage and rents. De Mooij and Ederveen (2008) in a survey of the literature find compelling econometric support for these effects. Optimal tax theory argues at the same time for a relatively lower tax rate for efficiency on the less elastic factors of production, namely capital relative to land, other natural resources and labour.

Another set of arguments for setting the Australian tax rate on capital income close to the rate of the main countries from whom we borrow and trade concerns the ability of multi-national corporations to significantly reduce their tax liability in Australia, and hence the Australian tax take (Auerbach, et. al., 2008). Revenue can be shifted to the lower tax rate countries via the manipulation of transfer pricing, and deductible overhead and debt expenses can be shifted to the higher tax rate countries.

The equity effectarguments for a higher rate of special taxation of the mining industry to fund lower corporate tax rates as part of an approximate revenue neutral package requires a careful tracing of some general equilibrium effects and it involves debatable value judgements. First, the corporate tax transfers to government close to a 30 per cent share of economic rent accrued on mineral deposits, so the case has to be for a larger share. Second, the tax mix change involves a redistribution of the tax burden with some winners and losers but for many a close to balanced outcome. Higher taxation, either by the special taxes on mining (measured as the SPRT, PRRT or MRRT net of royalties), or by corporate income tax, and recognising the different tax bases, reduces the disposable corporate income available for dividends or retained earnings. In an efficient market, changes in disposable corporate income would be expected to flow through to a one-off change in share prices. Then, the tax mix change package would result in a one-off windfall capital loss for shareholders of mining companies roughly balanced by a one-off windfall gain for shareholders of non-

mining companies[10]. Shareholders with balanced funds, including superannuation, will be little affected in net. Further, in time the efficiency gains which underlie the tax reform package turn it into a positive sum game where the wins more than compensate the losses.

A third and key bow to the equity argument for higher taxation of the rents earned on mining investments than the corporate income tax rate is that these non-renewable naturalse resources are owned by the people. A related equity argument is the special taxation of land. Land, like mining resources, is fixed in supply, and different parcels of land earn different rents depending on location and use. There are three sets of taxation on land: local government rates set at a flat rate on the unimproved value, but varying by municipality and shire with an average rate around one per cent per year; state land tax, except for the NT, applied mainly to land in the CBDs due to exemptions for primary residence, primary production and non-profit organisations and a progressive rate schedule which varies from state to state with top rates of from 1.5 to 3.7 per cent of the asset value; and conveyance duty on the transfer of property (including land and structures) levied at a progressive rate (Henry, et al., 2009). If the annual rental return is around five per cent, a 40 per cent rate on rents earned on natural resources could be said to be in the same ball park as special taxation of land. For businesses, these different forms of land tax are deductible against business income tax as is the case for royalties and the proposed SPRT and MRRT in measuring the corporate income tax base for miners.

The tax rate or share of the economic rent reallocated to government largely is an arbitrary equity choice. In principle the rate can be between zero and 100 per cent. However, to provide incentives and rewards for firms to develop and implement more efficient ways of mining and marketing requires a rate below 100 per cent.

[10] The government proposed package does not follow the AFTS proposal to use all the revenue to fund a lower corporate tax rate. In its proposal, while the gains to non-mining industry shareholders will be less than noted here, the list of winners includes the direct and indirect beneficiaries of the additional government outlays on the infrastructure fund and the tax concessions for the extra superannuation.

4. Measuring Economic Rent on Resources

Table 1 provides a comparative description of three different measures of the economic rent on business investments, including mining investments, together with the tax bases for the corporate income tax and the royalty system. In the context of the preceding section, the desired economic rent measure is akin to that shown by triangle PEA in Figure 1. The expenditure tax, or Brown tax, provides the benchmark. The resource rent tax which is the basis for the PRRT and the MRRT and the Allowance for Corporate Capital (ACC) tax base for the government renamed SPRT have different time patterns of net cash flows for firms and tax revenue flows for government compared with the Brown tax while still measuring economic rent. Under certain conditions all three have the same present value for the mining business and government (Boadway and Keen, 2010).

Table 1: Tax Base and Tax Rate for Special Taxes on the Mining Industry and for the Corporate Income Tax

| Tax System | Tax Base | Tax Rate |
|---|---|---|
| Special Mining Tax: | | |
| Brown tax | Rev – Lab – Mat – Invest | Flat rate; refunds |
| Resource rent | Rev – Lab – Mat – Invest – LossCF* (1 + Rl + Rr) | Flat rate; no refunds |
| ACC | Rev – Lab – Mat – Dep – NK*Rl - LossCF*(1 + Rl) | Flat rate; refund only at end of project |
| Royalty | Quantity or Rev | Specific or ad valorem |
| Corporate Income Tax | Rev – Lab – Mat – Dep – DebR - Special mining tax - LossCF | Flat rate; no refunds |

Rev = revenue; Lab = labour and management; Mat = materials; Invest = investment outlays; Dep = depreciation; NK = $\sum(Invest_{t-i} - Dep_{t-i})$ = net capital stock; Loss CF = loss carried forward; Rl = long term bond rate; Rr = risk premium; DebR = debt interest

The expenditure or Brown tax provides the ideal and benchmark measure of economic rent to the mining resource[11]. Economic rent is measured as gross receipts less outlays on labour and management, materials, and investment in capital equipment and buildings, exploration and R&D. These outlays are the non-natural resource costs of exploration, development, production and mine closure. For a tax rate, say 40 per cent, the government receives 40 per cent of a positive cash flow and if the cash flow is negative the government writes a cheque for 40 per cent of the loss. Deductible outlays for the Brown tax represent the opportunity cost of all non-natural resource inputs if they were employed elsewhere in the economy[12]. What remains is a residual return or rent on the immobile natural resource. For a tax rate, say 40 per cent, the government receives 40 per cent of a positive cash flow and if the cash flow is negative the government writes a cheque for 40 per cent of the loss. From the criteria of neutrality and efficiency, if the present value of the stream of revenue less expenses is positive before the Brown tax, and so a worthy investment, a share of this same stream of revenue and expenses after the Brown tax also is positive; and if it is negative before the Brown tax it is negative after the Brown tax and not a worthy investment.

As well as being a measure of economic rent, the Brown tax has a number of other interesting properties. By immediately expensing capital outlays, rather than spreading these outlays over time as depreciation allowances under income tax measures, the Brown tax effectively exempts the normal rate of return, or the compensation for deferring consumption and offsetting the effects of inflation, from taxation. The symmetrical treatment of cash flow gains and losses does not change the risk profile of the miner's investment. Effectively, the Brown tax makes the government a silent shareholder in the project since it receives a common share, equal to the tax rate, of any wins and losses incurred over the life

[11] This also is the R-base proposed by the Meade Committee.

[12] An implicit assumption is that there are minimal distortions elsewhere in the economy so that market prices equal social opportunity values.

of a mining project.

In the context of the time pattern of cash flows for most mining investments, the Brown tax would provide a very different pattern of transfers between the miner and the government to that of the royalty system and the corporate income tax. The capital intensity of mining discussed in Section 2 means that in the early years of a project government would be writing large cheques to the miner with the Brown tax. Government can borrow to offset these payments at the long term bond rate. It may be many years of production before government cumulative Brown tax payments and receipts turn positive, and longer in present value terms. TAlso, the inherent risks of mining means that some mines will end up with a negative cash flow over the project life, and government as a shareholder will make a net payment for its share of the loss. These implications have been of concern to governments. At the same time, governments and/or the electorate may be concerned about the credibility and commitment of companies to pay tax on positive cash flows during the mature phases of a mine or well. By contrast with the Brown tax, the government never writes a cheque to miners under the royalty system, the resource rent tax, or the corporate income tax.

The Productivity Commission (1991) and Smith (2010) propose that these concerns about the time path of cash flows, and other concerns with the volatility of government revenue, from a Brown tax could be handled by a separate and explicit resource rent tax fund, even a sovereign wealth fund, which then provides a smoother over time revenue stream to the regular budget[13]. . Henry (2010) argues that these functions can be handled through the normal budget process, and he doubts that sovereign wealth funds in practice so far have provided evidence of superior management.By contrast, the government never writes a cheque to miners under the royalty system, the resource rent tax, or the corporate income tax.

[13]- Henry (2010) argues that these functions can be handled through the normal budget process, and he doubts that sovereign wealth funds in practice so far have provided evidence of superior management.

For the Allowance for Corporate Capital (ACC) model originally proposed by Boadway and Bruce (1984) and recommended by AFTS (Henry et al., 2009), which was relabelled as the SPRT by the government, a modified expenditure tax base would be used. Relative to the Brown tax, the ACC would replace expensing of capital outlays with depreciation, as under the income tax. But, at the same time it would allow additional deductions for an imputed return on the net of depreciation capital stock (both equity and debt financed) as under an Allowance for Corporate Equity expenditure tax base model, any losses carried forward would be scaled up, and in the event of a net loss at the time of mine closure, government would write a cheque to the miner for its share of the loss. The imputed return on the net capital stock and the scale up factor on losses carried forward would be the long term bond rate (Fane and Smith, 1986). As under the Brown tax, losses and gains are treated symmetrically. With the government guarantees, mining firms are assumed to be able to borrow at the long term bond rate against the government share of future depreciation allowances and for any losses carried forward, and the risk profile of the reduced miner share of the project is unchanged. In practice, mining companies expressed concern about the credibility of future governments to write a check for its share of an accumulated loss. Using the long term bond rate as the scaling factor, the present value of a project to a miner remains unchanged with and without a ACC and so there are no distortions to investment and production decisions (as told in Figure 1B), and the present value of government tax receipts also is the same under the ACC and Brown tax[14] (Auerbach, et.al., 2008, and Smith, 2010, for numerical examples).

A slightly different model to the Brown tax is the resource rent tax. The current PRRT is a working example. The proposed minerals resource rent tax (MRRT) to apply to iron ore and coal is a variant of the resource rent tax, but with a more generous risk adjustment of seven rather five per cent of the PRRT, an additional 25 per cent so called "extraction allowance" as an additional deduction, and a lower tax rate of 30 per cent. With the extraction allowance, the effective MRRT

[14] For an alternative explanation using numerical examples, see Smith (2010).

tax rate is reduced to 22.5 per cent (= (1 – 0.25) 0.3)). Like the Brown tax, capital outlays are expensed, but at no stage does government write a cheque for negative cash flows, either during a project or at its completion. Rather, losses are scaled up and carried forward. Here the appropriate scaling factor for neutrality of effects on mining investment and production decisions is the long term bond rate plus a risk premium in recognition that a loss will not be compensated in the manner of the Brown tax or ACC. In the Garnaut and Clunnies-Ross (1975) paper, the scale up factor was the rate of return required by a miner to commit funds to the risky exploration and production project. The practical problem is that the risk of loss varies by project, and more importantly, no government has access to the information to set the risk premium project by project. In general, the resource rent tax in practice will not have a neutral effect on business investment and production. For example, the use of a common or average risk loading for all mining projects within an industry as a feasible and practical solution will mean a subsidy to relatively low risk projects and a tax on relatively more risky projects. In the context of Figure 1B, at the efficient P and Q combination, the line BE would be pushed upwards for a tax and downwards for a subsidy resulting in too little or too much investment and production, respectively. Even so, it seems likely that the associated efficiency costs will be much less than incurred with the royalty system.

By comparison to the Brown tax, RSPT, PRRT and MRRT, the income tax[15] falls on the normal rate of return on the investment in addition to the rent on the mineral resource. Since all other investments inthroughout the economy are income taxed, it is appropriate that the corporate tax also be imposed on the mining sector at the general rate for reasons of neutrality of taxation of the normal rate of return on capital. Also, for these same reasons a special increment in the corporate tax rate on mining, or a progressive profits tax, would be a second best way for taxing economic rents. While both the income tax and the ACC allow for depreciation rather than expensing of investment outlays (except exploration

[15] Here the income tax includes corporate income tax, the taxation of shareholder dividends and capital gains, and the income taxation of debt investors in projects.

which is expensed in all taxes) of the Brown tax, with the ACC relative to the income tax, losses carried forward are scaled up by the long term bond rate and a tax rate share of any carried forward losses at the end of a project are refunded. Over the life of the mine, the economic rent base will be less than the income base because it excludes the normal return on capital invested.

An alternative mechanism to collect the economic rent to the taxes discussed so far is to auction the rights to mine (Dowell, 1978, and Porter, 1981)[16]. Because the firm bears all the project risks, it will use a risk adjusted discount rate which is higher than the risk free long term bond rate applied with the Brown tax in calculating its maximum bid. Then, as Emerson and Lloyd (1983), the Productivity Commission (1991) and others have argued, the winning bid will be much less than 100 per cent of the risk free present value of the rents. In reality, information will be imperfect, and seldom will there be enough reasonably informed firms to support a competitive assumption. Also, the sovereign risk that future governments may impose additional special taxes on those mines which subsequently are revealed to earn much higher rents than anticipated (together with no compensation for those who generate less rents) leads firms to build in a significant risk premium in calculating the present value of the future stream of economic rents.

Of course, the economic rent tax and auctioning mechanism are not mutually exclusive. Emerson and Lloyd (1983) and later the Productivity Commission (1991) argue that given the reality of government imperfect knowledge about firm attitudes to risk and about the probability distribution of possible mineral reserves, output prices and input costs, and imperfect measures of economic rents, a mixture of a pre-specified Brown tax or resource rent tax with an upfront auction for new mines system likely will be more efficient and generate more government revenue.

[16] The auction method can have other and perhaps more important functions, including allocation of a mineral lease to the superior producer.

5. Some Other Issues of Implementation

There are a number of important details to be resolved to effect a transition for an established mining industry with current royalty arrangements to a economic rent system of taxation yielding a higher level of taxation revenue, both over the transition period and longer term. These include the treatment of existing mines, sovereign risk, and commonwealth-state financial relations, and the interaction of the resource rent and income taxes.

Existing mines were planned and developed under the royalty system. But, the form of royalty and especially the rates have been changed over time, and in general they have been ratcheted upwards in times of commodity booms. To the extent that most of the past investments are sunk costs, the proposed changes in special taxation primarily alter the distribution of quasi-rents on these investments rather than production level decisions. Over the longer term, the more important efficiency concern in changing the special mining taxes, and in particular in raising the net tax collected, is about sovereign risk discussed below and its effects on future investment decisions. As argued by Smith (2010), the option of grandfathering current royalties for existing mines would delay any significant additional revenue collection for many years, and it would bring complexity and high operating costs for existing mines when they make investment up-grades to be taxed under the new tax structure in the future. At the same time, Smith notes that current mines represent an atypical set of profitable mines and excludes those which failed so that taxing only the remaining profitable mines becomes too high. While valid in the context of the Brown and RSPT taxes, this argument is of less impact with the resource rent tax which does not compensate losses at mine closure.

In terms of equity, Garnaut (2010) and Henry (2010) argue that applying a constraint that no one should be made worse off with tax reform, and in particular as it affects capital income more than labour income, even if the changes generate significant national productivity gains, is very costly. Such a constraint would, for

example, and it would have ruled out most of the microeconomic reform agenda of the 1980s and 1990s. The reality that existing mines have benefited from government funding of public good information to assist exploration through AGSO/Geosience Australia and their predecessors, and being granted the right to mine privately owned land, might be adduced as counter equity claims for higher taxation of existing mines. These concerns favour attempting to replicate the operation of the resource rent tax base to existing mines using actual past expenditures and receipts, and perhaps on equity grounds with the option of a gradual path of tax rate increase from the current burden to that under the new system.

Sovereign risk associated with future governments changing taxation arrangements, and also such matters as security of property right tenure and environmental requirements, work to increase the level of uncertainty about future returns from mining investments. Such uncertainties warrant, then a rise in the required risk premium, with the result of and a reduction in investment and production levels. At least in the short run, the current proposals for changes in the special taxation of mining are argued by the industry and others to have raised sovereign risk. But, what of the longer run? Arguably, a special tax based on sharing economic rent, and at a higher expected long term revenue collection, will prove a more sustainable and enduring tax system which, in turn, will reduce sovereign risk relative to the royalty system. Along with the income tax, the economic rent tax collects more revenue in times of commodity booms and less in times of commodity slumps. Also, it collects more from the more favourable endowed mines than other mines. These design properties appeal to notions of reasonable and fair, and so make the economic rent tax more robust to calls for changes on equity grounds if and when industry profitability changes in the future. Even so, increases in the rate of tax in the future cannot be ruled out. In terms of empirical evidence, while the design and rate of the PRRT has not changed significantly since its implementation in 1984, there have been many changes, and all in the upwards direction, in many of the royalty rates over the last two decades.

Overall, after a transition period, proposed changes to the special taxation of mining are likely to reduce sovereign risk.

Constitutionally, on-shore mineral and energy resources are owned by the states (and territories), and they collect the royalties. Both the AFTS and the commonwealth in their proposed reforms for the special taxation of the mineral industry opt for the commonwealth to impose a replacement and higher level of tax on economic rent. As part of a much wider taxation reform agenda embracing all state taxes, the AFTS proposed establishing a new intergovernmental agreement. By contrast, the commonwealth proposed reform retains company royalty payments to the states and the commonwealth directly compensates the companies for these payments funded from the new tax; and with details of the future path of royalty rates and payments to be determined. Neither proposal is without serious challenges and costs. Greater certainty for miners and for both tiers of government, and simplicity, seem more likely if the more ambitious AFTS was to come to fruition. But, the commonwealth more pragmatic proposal clearly is a quicker and easier option to negotiate.

## 6. Conclusion

Shifting from the present output base royalty system to an economic rent base system for special taxation of the mining industry offers a number of advantages. Foremost, it would reduce efficiency losses by reducing distortions to the choice of mining investment and production decisions and by providing revenue from a relatively non-distorting tax on an immobile factor as part of a tax mix package which funds lower tax rates on more distorting taxes on internationally mobile factors, such as a lower corporate tax rate. A resource rent base tax provides the opportunity to collect in a less distorting way more of the returns on community owned natural resources than the corporate income tax and ad valorem royalties. In particular, more favoured mineral and energy deposits contribute more than the less favoured deposits, and more is collected in times of commodity booms and less during commodity slumps. These later characteristics also seem likely to

reduce sovereign risk. , and oOnce the challenging transitional adjustments are accommodated, the proposed changes should to reduce the risk premium required of mining investments.

The expenditure or Brown tax is the ideal benchmark for measuring the economic rent on mining investments. Concerns with governments writing cheques, and often large sum cheques, to miners in the early stage of new projects when cash flows are negative have led to the development of Brown-like tax bases. The AFTS review proposal for an ACC system, which was relabelled by government as a SPRT, has the same economic properties as the Brown tax and requires government cheques only for mines which are still in loss at the time of shut down. Resource rent taxes, which are the underlying framework of the PRRT and the proposed MRRT, exclude any government writing of checks to the miners, but at the cost to restore neutrality of adding a risk premium to the uplift factor on losses carried forward. The challenge is that the risk premium varies by mine and is unknown to government. An undesirable consequence is that these realities provide a fertile ground for industry to lobby for preferential treatment, with the costs to society of too much mining and a loss of special taxation revenue.

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