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ECONOMIC RENT, TAXATION AND WATER INDUSTRY

A RESEARCH PAPER

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ECONOMIC RENT, TAXATION AND WATER INDUSTRY

I. INTRODUCTION

The concept of "Resource Rent" or the "economic rent" earned by resources has been receiving increasing focus in the Australian Government's policy analysis. An important corollary of this has been the development by the Government of various policy measures including the outright sale of resource rights, ad valorem and per unit royalties, resource rent tax and so on. The rationale given is that the "resources" are a community product and therefore the public should have a "portion" of the potentially excessive returns that are generated from its exploitation.

Attempts have already been made by Australian academics and policy makers to apply the concept in the areas such as petroleum, mining, forestry, land development and so on. This paper attempts to demonstrate the nature of rents as it accrue in the Victorian Water Sector. It argues that for a very large part of the water sector particularly the area to the south of the Great Dividing Range the water supply operations do not generate any "rent" in the traditional sense of the term which is defined with respect to factor supply or factor supplier. This is because there is no producers' surplus and the market value of resources as reflected in prices do not exceed the supply price of investment. However the RWC by pursuing an inefficient and below equilibrium pricing policy is allowing some consumers' surplus to be accrued to various non-metropolitan water authorities and final consumers. These surpluses derived from water are not rents "per se" but have the potential to become "rents" when some above competitive return or income is realised by trading the water in the market place.

In Victoria "rents" can persist even in the long run as the water currently, is not perfectly transferable between areas and users because of both (i) physical limitations with respect to transferring water between systems and (ii) social and legislative constraints that preclude free-trading of water. Other important sources of sustenance of "rents" in the sector are absence of perfect information flow to market participants about the "true value" of water, widely scattered markets, system of special rights or privileged access to water for some users in the form of Water rights, Diversion Licences, Permits etc. (MMBW's exclusive access to big catchments is an important source of rent).

The existence of these potential and unrealised "rents" in some parts of the water sector suggests that water as an input has not been optimally utilised and has been committed to or used in low-value product or low productivity areas. This is clearly a misallocation of social resources and loss in terms of foregone revenues.

The main objective of the paper is to introduce the concept of resource rent amongst water sector managers and to trigger a wider discussion in the industry of the implications of the concept in terms of lost productivity and revenues and to stimulate further in-depth research in the area aiming at assessing the magnitude of such social losses and seeking ways of improving water sector productivity. The paper also provides some indications of the possible options open to water resource managers and planners through which it could help dissipate the "rents" from the sector. Among the measures considered crucial are removing the market imperfections through introduction of a freely tradable and transferable water entitlement both across areas and across time, integration of separated water markets by removing, as far as practicable, physical and legal bottlenecks, and improvement of information flow among the market participants about prices.

Once the imperfections are removed and market participants have access to smooth water supply and improved allocation, it is expected that the market mechanism will pull the trigger to move the water suppliers and authorities towards pursuing more appropriate and efficient pricing policies. This process, in turn, would also alleviate the social losses accompanying the rents.

II. DEFINITION OF ECONOMIC RENT

The term "Rent" is often defined as the return to any resource whether this be land or any other form of capital. In the most common usage the term, of course, is referred only to the return of land and its associated structures. In modern price theory, the concept of "Economic Rent" is carefully distinguished from the ordinary concept of "rent" as the return to land and is generally defined with respect to the conditions of factor supply. According to this notion, "economic rent" could be earned by any factor whose supply is perfectly inelastic. The modern definition of "economic rent" thus covers all factors of production and not just land. It is even pointed out that not all lands enjoy economic rent because not all kinds of lands are seen as inelastic in supply. To be more precise, economic rent is defined in one of the two ways: (i) It is either the return given to

a factor or resource over and above what it could earn in its second best or next most favourable employment; or (ii) It is the income or return received by a productive factor or resource over and above the payment required to keep it in that usage. These two definitions are consistent with each other only when the supply conditions of the factor or resource in question are inelastic. In other situations, we have to choose either one of the two definitions. A particular income or return which could be called "economic rent", according to the second definition, may not be termed so under the first definition. Problems of inconsistency arises, for example, when the second-best or next best employment of a resource actually has a higher monetary return but an outweighing non-monetary disutility or disadvantage associated with it. Further, if the supply of the factor is not completely inelastic it would be very difficult to identify the economic rent under the second definition, as then the owner of the factor may change the quantity offered and disguise or conceal the information on the minimum payment required for its employment. However, if the factor or resource is permanently fixed in one particular employment with no other employment opportunity available to it, then the entire return or payment would amount to economic rent.

III. APPLICABILITY OF THE CONCEPTS OF 'RENT' AND RRT IN VICTORIAN WATER SECTOR

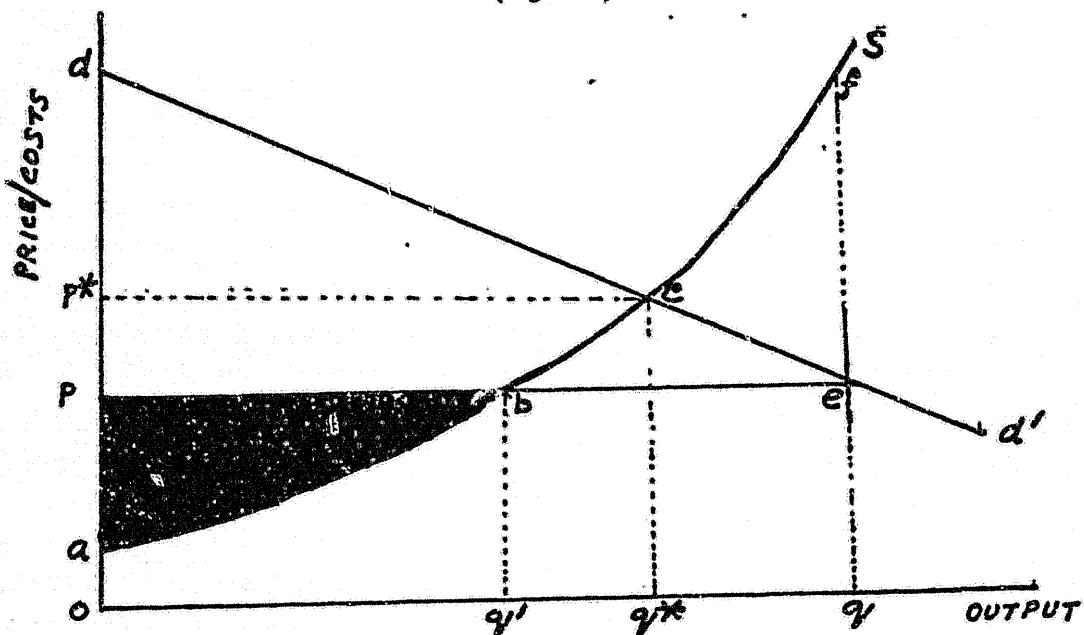
The concepts of 'Economic Rent' and 'Resource Rent Tax' have been receiving increasing focus in the Australian Government's policy analysis and have, in fact, become a centerpiece of the Government's policy towards the resource industries.

In the last two decades (particularly since the appearance of the article published by Garnaut and Clunies Ross in 1975) the Australian academics and policy makers have attempted to apply the concepts in the areas such as petroleum, mining, forestry, land development and so on. In fact, in the area of petroleum the Government has already passed a legislation imposing a RRT on the super-normal profits (that is, return in excess of competitive return) of offshore Australian petroleum projects. Discussions are also underway to tax the rents that currently accrue on some mineral projects run by private companies. Of course, the existence of mineral rents is already recognised as the companies are made to pay mining royalties to the Government for the right to extract resources. These rents accrue to mining, petroleum or, for that matter, forestry, land development and other resource industry areas because of access to some natural advantages of location,

grade, ease of recovery of deposits and extraction costs. The question now arises that do such resource 'rents' accrue to the water industry of Victoria? It would be useful if the answer or the analysis could be pursued by relating to the following graph (Figure 2). Earlier in the paper we have defined the economic rent of a factor of production (such as land, labour, machine or any form of capital etc) as the payment or income received by that factor or resource in excess of its supply price or whatever payment is required to keep it in that usage.

LONG RUN ANALYSIS OF WATER INDUSTRY RENTS

(Figure 2)



In other words, it is referring to the 'producer's surplus' or the shaded area represented by apb in the diagram which shows the magnitude of the 'rent' earned by suppliers because of the difference between 'market price' and their 'supply price'. This traditional concept of 'rent' does exist in the mining, petroleum, and other resource industries (at least in the theoretical sense) as long as we assume that the 'resource values' (as reflected in the market prices) reaped by investment is greater than the 'supply price of investment' (as manifested in the supply curve). Of course the actual size of this 'shaded area' would be much greater in the context of petroleum and mining where the market prices for those resources are likely to be much higher than the equilibrium price (and not lower than equilibrium or market clearing price such as $OP < OP^*$ in this diagram) given the restrictive access of investors in resource rights and the non-competitive nature of the industry.

The below-equilibrium price OP is drawn in this diagram to reflect the realities of the southern part (ie. area to the south of the Great Dividing Range) of Victorian water sector where prices charged to the non-metropolitan town authorities are not only much below the equilibrium level but also are the ones which failed to cover the long run marginal costs of supplying water.

On the quantity front, such pricing has led to over-building of water supply systems and reservoir capacities, that is, systems built much beyond their optimal level. Thus, the overall result has been inefficiency in the long term water allocation, enormous loss of social product, both in terms of "dead weight loss" and in terms of transfer of resources from the community of Victoria as a whole, to the users of water since a large part of the costs of supplying water is borne by the community. Thus, strictly speaking, there is no economic rent in the southern part of Victorian water sector as there is no surplus accruing to the water supplier. In other words, there is no "shaded area" (in terms of diagram) in the traditional sense of economic rent which is defined in relation to factor supply or factor supplier.

The gain from such water supply actually accrues to the consumers or water users (ie. town authorities as well as final consumers). In a very loose sense, it can somehow be termed 'consumers' surplus' but not in the strict sense. Because strictly speaking, 'consumers' surplus' is the area generated by the difference between consumers' willingness to pay and the market price. Again, this 'consumers' surplus' concept or area dpe in strict sense is not the one we are referring to when we say 'rent' accruing to consumers, since such 'surplus' can accrue even when efficient or equilibrium price exists, such as the area $dp \cdot c$. Rather, we are referring to 'gains or surpluses' that accrue to the consumers or water users as a result of both lower prices paid and higher quantity consumed. The price currently charged is OP at which the demand is oq and the excess demand is qq . The supplier, instead of eliminating this excess demand with appropriate pricing, actually complied with it by increasing supply at a huge social cost since the long run marginal cost of supplying oq level of water is qf .

The consequential loss to the Victorian society as a whole is given by the area fbc , a portion of which that is cbe , is transferred to the non-metropolitan town water authorities and other final water users as 'rents'. In addition, the consumers also capture 'value' gains of an area represented by $cp \cdot pb$. However, the area represented by fce is a "dead weight loss" to the society in the sense that this

portion of the value of our water resources does not accrue to anyone. This "dead weight loss" can be interpreted in practical terms as the wastages or wasteful use of water by consumers presumably due, largely, to a revenue policy pursued by the suppliers of water which primarily taxes the property values (rates) rather than charging the volumetric or incremental supply of water. Quite understandably, such a system creates no incentive for consumers to make economic and rational use of their water supply.

It is clear from Figure 2 that the bigger triangle area dpe is the total 'consumers' surplus'. However, as indicated earlier, the surplus equal to dp^*c would have accrued even with efficient equilibrium price (assuming the suppliers do not behave like discriminating monopolists and do not use perfectly measured block-pricing). The actual total surplus area gained by the consumers and water authorities which could be explained solely by the inefficient, below-equilibrium pricing is given by $cp^*pb+cbe$ that is the area cp^*pbe . This surplus area is not 'rent' 'per se' even in the loose sense of the term, but does have the potential to earn economic rents, i.e. it will become 'rents' only when some above-competitive return or income is realised from its use or trading. In concrete terms, the 'surplus' derived from the water resources purchased by the consumers and various non-metropolitan water authorities can, in principle, be translated into 'economic rent' by selling that water at a higher price to other users whose valuation of water or needs for water is even higher or, alternatively, by using that water to produce something which has unusually high returns. In such a situation, of course, the area we would be referring to is conceptually equivalent to the "shaded area" of Figure 2 (or the entire area above the supply curve, but below demand curve if the consumer-supplier behaves like discriminating monopolist) since the consumers are now acting like suppliers.

If the resource (water) had been perfectly transferable from one area to another and from one person to another, 'rents' would have ultimately disappeared since in that situation more and more water would have flowed into the most high-yielding production line leading to the elimination of abnormal profit and that, in turn, would have automatically allocated resources to their best uses. But that is not the case in Victoria. In this State 'rents' can persist even in the long run as water is not currently perfectly transferable between areas and users because of both:

- (i) physical limitations with respect to transferring water between systems,
and

- (ii) social and legislative constraints that precludes free-trading of water (eg. farmers can sell to farmers but not to towns).

Among the very root sources for the sustenance and continuation of the 'rents' in the Victorian water sector are the inefficient and below-cost pricing of water by the Rural Water Commission, and subsidies of one form or another to the authorities and consumers. These special advantages help the consumers and authorities to harvest higher than competitive return by making good use of the widely scattered market where participants quite often are uninformed of the "true" market price.

Another important source of possible rent is the system of water entitlements or water rights in Victoria, whereby special right or access to a specified amount of water each year has been created by the Government. The rights, mostly in the form of Irrigation Water Right and Diversion Licences and Permits, have since a long past been allocated by officials often arbitrarily on the basis of land ownership rather than the demand condition. Such privileged access to and security of water for some users which precludes other users from having the same access and security does leave rooms for 'rent' generation by removing competitive elements from the market. Again, they are just 'potential rents' and can be converted into 'actual rent' only when a higher than normal return or income is realised by the act of trading the water in the market place or using it in some production line.

In fact, any form of restriction on the free flow or mobility of water between areas or people, be it governmental regulations or physical limitations of transferability, can give rise to 'rents'. Although a system allowing bidding for 'water rights', 'diversion licences' and 'sales water' through public auction has been introduced on a limited scale in Victoria (particularly in Loddon River, Goulburn, Broken and King Rivers). Since 1988, such biddings are largely non-competitive due to the exclusion of a very large number of farmers in other parts of Victoria who are not competing in the bid. There is a strong likelihood that the supplier in such an imperfect bidding system would reap a huge rent as buyers do not have the perfect information on the 'true price' or 'value' of the water they are buying. Complexities arise as it is not feasible to conceive of one true price in Victoria since the costs of augmenting water supply are different in different areas and systems of Victoria, and to that extent, it is not a one whole market, rather various segmented markets are existing in the State. Difficulties in analysing the

market mechanism is even increased as there is a large number of unequal suppliers in these markets with each facing a different cost-structure and demand curve.

Other areas worth identifying where 'rents' are accruing almost on a regular basis are the 'big catchments' of MMBW. Because of its exclusive access to those catchments, MMBW possess some monopoly powers in the areas to dictate the price and thereby extract higher than competitive return. The pricing of water by MMBW during drought which is substantially higher than the normal season, is another example of the Board's relentless pursuit of rent-seeking. In the 'South' of the Great Dividing Range, the Board currently is charging prices which are well above their marginal costs of supply. The water supply capacities and reservoir storages which the MMBW already has at its disposal can well last another thirty to forty years without causing significant increase in marginal costs. Until that period there are scope for substantial 'rent' generation for the Board. However, once their current water supply systems in the 'South' begins to be exhausted their marginal costs of water supply will shoot up drastically, since they currently do not have access to the water supply of the 'North' where costs of augmenting water supply is still very low. The market of water supply in the North and the market of water supply in the South are still segmented. Therefore, all the 'economic rents' that are currently accruing to MMBW will simply vanish away in the long run unless the Board can somehow break the barrier of the segmented markets and obtain low-cost supplies from the North.

As far as the Rural Water Commission in the South is concerned, it itself is not obtaining any rent. However, it is allowing the 'potential rents' to be accrued to the various non-metropolitan authorities and other consumers in the form of 'consumers' surplus' which have the 'potentials' to be converted to 'rents' by trading in the market place.

Implication for the sector

The existence of these potential and unrealized rents in some parts of the water sector along with the 'realized' rents' in some other parts of the water sector suggest that water as an input has not been optimally allocated and in many cases has been committed to or used in low-value product or low productivity areas. This is clearly a misallocation of socially owned resources and loss in terms of foregone revenues.

Policy Options Indicated by the Paper

Where do we go from here ? what do we do about these rents once they have been identified?

There are three clear policy options:

Option 1

Remove as far as practicable, all the barriers and imperfections from the water markets. In other words -

- (a) Make water a freely tradable and transferable good both across areas and across time (ie between seasons);*
- (b) Integrate the segmented or separated water markets by dismantling to the extent possible , the physical and legal hurdles or bottlenecks;*
- (c) Improve the information flow among the market participants about the prices of water.*

With the removal of these barriers, water will move first to the most productive or profitable area that is, the area where the water would obtain its highest value and so on.

Given the market structure that we have in Victoria, it is likely that the water for the State as a whole, will move in something like the following fashion:

First 20% to Urban Consumption
 Of the remaining 80% -
 10% to Fruits/grapes etc then
 25% to milk (favorable areas) then
 10% to milk (less favorable areas) then
 35% to Grazing/cropping etc
 (Transport cost will be reflected in prices)

Long-term offshoot of Option 1 :

Once the imperfections are removed and the market participants have access to smooth water supply (or improved allocation), it is expected that the market mechanism will pull the trigger to move the water suppliers and authorities towards pursuing more appropriate and efficient pricing policies. This process, in turn, would also alleviate the social losses accompanying the rents.

Option 2

Determine the appropriate or economically more efficient level of water prices (there will be one price for each physically separate market) and implement those determined prices.

The assertion that pricing solution is the best solution is based on the argument that correct and optimal price ensures efficient resource allocation and is the ideal way of dealing with the problems of over-investment or under-investment in any economic activity.

The 'determination' (of prices) part of Option 2 doesn't appear impossible or too difficult since the Government does possess or can at least gather good information on the augmentation and other associated costs of water supply. Such information would enable the Government to devise the efficient pricing policy by establishing a direct link with the costs that water users directly impose on the water supply systems.

It is the 'implementation' part that is more difficult politically since there will be large social repercussions or backlashes to massive increase in water prices implied by efficient prices.

Option 3

Tax away all forms of rents currently accruing in the water sector by introducing and implementing a 'Resource Rent Tax'.

Although a 'Resource Rent Tax' has distinct advantages over other forms of charges such as lump sum fees (through outright auction of resource rights), per unit and ad valorem royalties in respect of better resources allocation and higher revenues, it is not considered warranted in the water sector.

The primary justification of a Resource Rent Tax in areas like mining and petroleum is the existence of a high degree of uncertainty as well as ignorance on the part of the Government about the costs of production and prices of the product and also the existence of very few producers in the market. In other words, in the absence of pricing based system of resource allocation (which automatically ensures an efficient outcome) in those areas, the Government chose to tax away the excess profitability. In case of water, as pointed out earlier, the Government do have good information on costs of augmentation to work out and effect optimal prices since the Government agencies themselves are the producers.

It would be useful to clarify here that the Public Authority Dividend (PAD) is a genuine minimum return on equity and is rightfully due to the equity owners. That is, it is the normal return on the opportunity cost of the equity component of capital. It is not any excess return. Unlike the Board of Works, which does pay back this 'opportunity cost' of equity funds used by them to the ultimate owners of equity (ie. people of Victoria or to its agent the Government) in the form of 'dividends', most water authorities do not pay any dividends. They do, however, make only the interest payments in respect of the funds used. In other words, they are treating the "equity" funds (of the people of Victoria) used by them as "debts" thereby giving the equity owners a lower return than what is warranted since the opportunity cost of equity funds are usually higher. For this reason, there is a suggestion in some quarters that the Government could choose to obtain the Public Authority Dividend in those cases as a source of revenue. But it must be clarified here that 'RRT' is a tax on excess return and therefore is not equivalent to PAD. Further, the implementation of an RRT in the water sector is not an easy task particularly in view of the fact that many water authorities, at present, are not even paying back the opportunity cost of funds.

All farmers, likewise, must be allowed a minimum normal return. The Government ought to do further investigation to establish what that minimum normal return or price is.

If the Government does choose to tax the farmers trading or transactions, it must tax only on the portion of return which is beyond the normal minimum return. Those taxes will be very difficult to implement.

Recommendation of the Paper

The Paper recommends Option 1.

APPENDIX

A. RELATED CONCEPTS

A careful examination of the history of economic rent doctrines reveal that many different concepts of rents are in the usage. We begin the analysis with Land Rent.

Land Rent

Physiocratic Notion

The development of the concept of land rent dates back to the middle of the eighteenth century when a group of French court physicians, known as the Physiocrats, were engaged in the construction of the idea of the circular flow of income in the economy. One of the conclusions they then arrived at is that only in the production in the land - in agriculture - was there produced a genuine "net product", a true surplus over and above the real costs of production. This net product or surplus was received by the owners of agricultural land as rent. All other sectors of economy other than agriculture were viewed by the Physiocrats as "unproductive" or sterile which consisted in the mere transformation of goods into different forms and in the provision of services. The analysis of the Physiocrats was of course grossly wrong as they focussed merely on the physical aspects of goods and failed to see that the transformation, for example, of wheat into flour, of flour into bread, or of bread in the kitchen into bread on the dining table are all equally as productive of utility to the consumer as is the initial transformation of seed, labour and land into wheat. These physiocrats, who had no modern notions of utility, thus couldn't conceive of accumulation of any rent in any other sector.

Ricardian Rent

Being significantly influenced by the Physiocratic ideas, David Ricardo developed his well known classical theory of rent which is remarkably more sophisticated than that of the physiocrats but drew basically equivalent conclusion. Ricardo was originally trying to explain the causes of value and with respect to land he expounded that all values are really determined on marginal lands. He explains that as the population of an economy increases, it is necessary to extend the food production to poorer and poorer grades of land (as rich lands will be exhausted).

But since the amount of labour and, therefore, wage payment involved in the production in poorer land is much more than on the rich land, it follows that the "price" or "value" of the product would rise as population increases and as more and more land comes under cultivation. But since the landlords owning the rich lands also gains the advantage of higher product price without making higher wage payments, there will accrue to them a "rent" which represents the return over and above the costs of production on the marginal lands. How large the cost of production on the marginal land will be, of course, depends on the amount of cultivable land in the economy and the rate of increase of the population. In the opinion of Ricardo, rents of superior lands would continue to go up so long there is an increase in the population.

Thus the rent of superior land, which Ricardo called "the original and indestructible powers of the soil" was, in a sense, genuine surplus received by landlords. Because unlike the income or return earned through labour, or by the abstinence involved in saving and investing, there is no pain or discomfort involved in securing this rental return. This so called land rent, thus, is neither part of cost of production nor the contributor to higher product value or product price rather it is an offshoot of higher price. The basic flaw in this nicely presented Ricardian theory is that it completely ignored the concepts of marginal productivity and opportunity costs - the ideas which were, of course, developed much later. The marginal productivity theory can demonstrate that the rents received by landlords represent the marginal productivity of land - that is, contribution of the land to total production. This theory treats land like any other productive resource. Thus the full rental return could be termed surplus only if land is fixed to only one employment and has no alternative uses or opportunity costs. But once the land is found to have many uses, the land rent becomes a cost - a payment similar to any productive factor.

Modern Concept of Rent

In modern times, the explanation of land rent is no longer related directly to the "original powers of the soil" or grades of lands but indirectly to these elements through the mechanism of the forces of supply and demand. There is no general agreement on the concept of supply of land. Some researchers measure it in terms of physical units such as acres and others tend to assess it in terms of productive capacity. If one restricts oneself to the first type of measurements for the economy as a whole, supply of land is fixed and inelastic with respect to changes in price then many of the early classical notions of land and rent are still valid. It is

then possible to hold that it is the demand for land in its capacity as a factor of production alone (since the supply is fixed) determines the annual price or rental value of land and further, that the price of the products of the land is not determined by the costs of production in the land.

Thus for those grades of land considered fixed in supply, an increase in demand will always increase rents, both in the short and long run. The demand for land, in turn, increases whenever there is an:

- i) increase in population,
- ii) increases in the number and intensity of uses to which land may be put, and
- iii) increases in the price of its products.

Since all the three factors are present in the long run, and assuming supply is fixed, many researchers a century ago predicted that land rent as a proportion of national income would increase overtime. But this did not quite materialise as technological advances precluded large price increases of land by increasing quantity of output from the land. Thus technological improvement is seen as a way of increasing the "supply of land" into a limited extent, by increasing its productive capacity.

In modern times, land rent is perceived more in terms of its scarcity and differential productive powers. It takes the form of scarcity rent when the demand for land is large enough to require the use of all available land. The land rent may also have the characteristic of "differential rent" if the different units of land have different productive capacities. In a sense all rents are "scarcity rents" as well as "differential rents". Because the scarcity of factors is a fact of economic life and that scarcity may be measured relative to other factors or with respect other units of a different grade of the same factor.

It has already been pointed out that quite often entire net return to land is treated as a "surplus" and is termed economic rent. This is of course justified on the ground that the aggregate supply of land to the economy as a whole is inelastic. This view, however, becomes quite shaky once the aggregate supply of land is measured in units of productive capacity rather than in acres or such physical measurements. And even from the point view of user of land, the payment is considered not as rent but as a cost for factor use. It is the payment required to

keep the land away from its competitors and therefore cannot be called economic rent.

Quasi Rents

In times of rising demand or other favourable economic circumstances many well-located productive resources which are in short supply will earn returns or income similar to economic rent. Since these types of returns are very temporary in nature and do not enjoy long durations, they are termed "quasi rents". For example, capital goods used to produce a commodity which has become unusually popular would be attracting for a short period a return in excess of the prevailing interest rate. However, as more and more capital flow into the production line, this "quasi rent" or excess return will disappear. One of the important functions that such "quasi rents" perform is direct resources to their best uses.

Entrepreneurial Rent

It is not easy to measure the entrepreneurial rent. Roughly speaking, entrepreneurial rents consist of the payments for the factors which are specialised to each firm. In competitive theory of firm, the equilibrium condition requires that price be set equal to average cost of each firm in the industry. This equilibrium, however does not always give a picture of all the forces at work; particularly the breakdown of the costs into familiar classes of fixed and variable, or avoidable costs are not shown. If we do such a classification and then deduct variable costs from price then in the short run the residual would include among other things, any returns to the fixed capital investments. It could well be that some of these residual returns are actually quasi rents and not economic rents as they are transitory in nature and would disappear as soon as adjustments in resource supply take place. But part of this residual return would possibly be non-shrinkable and would continue to remain as they are the returns or payments for factors which are specialised to the firm. Unlike quasi rents this return to the specialised factor will not be eliminated by adjustments overtime. This return is thus not a short run return and could be called "economic rent" as it is a return to a specialised entrepreneurial capacity - a factor which could be used only by its owner or the firm with which the factor is associated and which has no alternative use. It is essential to bear in mind that the abovementioned returns or payments to the specialised factor (in this case specialised entrepreneurial capacity) are in part anticipated and in part unanticipated. Only the anticipated return could be called

"economic" or "entrepreneurial rent". The unexpected returns are due to unforeseen events and are called "pure profits". In other words, there is a motivation force working (in the firm) behind the "entrepreneurial rent" which is seen more as a reward. whereas "pure profits" are unexpected windfalls which do not influence decisions.

Surpluses

The common elements which both "economic rent" and "surpluses" share is that neither is required to generate or motivate economic activity and both could be associated with consumption as well as production. Very broadly speaking, all economic rents are surpluses, but not all surpluses could be termed economic rents. A basic point of difference between the two concepts is that the emergence of economic rents could be accounted for primarily by the conditions of limited or inelastic supply, whereas surpluses could be generated both on the supply and demand side. On the demand side, surpluses accrue to individual consumers who would be willing to pay more for a commodity than the market demands (ie. market price) and hence, we get the term "consumers surplus". Extension of the same kind of argument would also be able to explain what is known as "Producers surplus".

Capital Gains

The term "Capital gain" refers to the financial or economic gain resulting from the sale of a capital asset at a higher price than was paid for it. The gain thus is an appreciation of capital value and creates in the hands of a receiver a surplus or a kind of unearned income. The concept, therefore, bears close kinship to economic rent. In fact, there arises often confusion between "economic rents" and "capital gains" and the line of demarcation is blurred since both are considered as unearned or non-labour economic gains. A clear example would be increases in the value of real property or land resulting from the growth of population and economic activity which push up the demand for land. This increase in land value could be categorised under both economic rent and capital gain. Despite this overlapping, the two concepts are distinct. As indicated earlier, economic rent emerges under inelastic supply condition of the factor or property concerned and therefore cannot cover all properties, whereas capital gains can cover all properties regardless of supply conditions, - of course the gain has to be of the irregular or unusual sort occurring outside the normal course of earning one's income. Thus a grocer's gain from the purchase and sale of groceries would be treated as his normal earned

income, while any gain from the sale of his residence would be regarded as capital gain. On the other hand, economic rent can accrue quite regularly and within one's normal course of earning and may exist both in the short run and long run. Another point of major difference is that a tax on economic rent cannot be avoided or its payment delayed by one whom tax is imposed, whereas in case of capital gains, since the gains are usually taxed on "realization" basis and not on "accrual" basis, persons have greater control over the timing and, in fact, tax can be avoided throughout the person's lifetime, the property being passed onto heirs.

B. IDEOLOGICAL BASIS OF TAXING SURPLUSES AND ECONOMIC RENT

The ideological basis of taxing surpluses and economic rents are as old as the French Physiocrats who first proposed that the "net product" on the surplus produced on the agricultural land and received as "rents" by the landlords be made the source of taxation. Although the origins of the taxation of land itself stem from the medieval conceptions of land as being held in "common ownership", the notion of surplus in the land as a source of taxation came into the theories only after the Physiocrats. Then came David Ricardo's classical theory of differential rent which showed that the landlords owning the rich lands were receiving returns over and above the costs of production on the marginal lands and that this surplus income shares were received without any real efforts or sacrifice. These ideas of Ricardo are, to a significant extent, responsible for triggering discussion and in generating popular support for a policy of land taxation. This movement received its impetus in the United States through the efforts of Henry George (and through the results of his book entitled "Progress and Poverty"), which supported the consolidation of all taxes into a 'single tax' on land values. Thus the proponents of this single tax accepted the Ricardian theory without any reservations or critical evaluation. The development of the conception of Ricardian Rent was also followed by a provocative idea, usually associated with Hobson, that the taxation of this social surplus could be accomplished quite efficiently without disturbing the economy. Both the movement working combinedly considered "single tax" to be the most efficient of all taxes and propounded that the undesirable effects of ordinary taxation would be completely removed if only pure "land" was taxed. A third factor which lent considerable support to the movement was a common observation of the rapidly growing urban areas in the United States. The observation revealed that the owners of land located closer to the rapidly growing cities were in an extremely advantageous position to reap large capital gains since capital values of lands in

such areas were rising rapidly without having the landowners to make any effort or sacrifice. Thus three things:

- i) Ricardian rent theory,
- ii) Hobson's ideas of the efficiency of taxing social surplus, and
- iii) the empirical observation of increasing urban land values

are mainly instrumental in generating wide support for a policy of taxation of real property, particularly land. Although the movement was never successful in translating the "single tax" into practical action, it was not an effort without significant impact. In fact the importance of modern property taxation in the local government fiscal systems must be attributed, at least in part, to the strength of this movement. In modern times, the intuitive appeal to the taxation of surpluses and economic rents lie in the similar idea that the whole payment of surpluses and economic rent are an unnecessary payment - that is payment not required to get the resource or factor into production. However, in the modern theory of economic rent, the surplus or unnecessary returns embodied in the idea of "economic rent" could be earned by any factor or resource not just land. There is, therefore, no economic rationale why land alone should receive differential taxation treatment for generating economic rent.

Modern Underlying Principles for Taxation of Economic Rent

There is a universal consensus that the tax system of a country, as far as practicable, be equitable - that is each taxpayer should contribute his or her "fair share" to the costs incurred by the government. But there is no hard and fast rule for determining what is "fair share". There are a number of approaches taken in the context of distributive justice. Two major approaches could be distinguished here.

The first one is based on the so-called "benefit" principle which dates back to Adam Smith and earlier writers. According to this principle, an equitable tax system is one where each taxpayer contributes in proportion to the benefits he or she receives from public services. This principle suggests that the equitable tax system is dependent on and will vary according to the public expenditure patterns. Thus the principle actually implies a tax-expenditure policy rather than just a tax policy and simultaneously solves revenue and expenditure aspects.

The second approach is based on the 'ability to pay' principle according to which the tax authority first determines a given amount of revenue required and then each taxpayer is asked to contribute in line with his or her ability to pay. Thus, this approach leaves the expenditure side of the public sector aside and the tax is determined independent of the expenditures which is less satisfactory from the economist's point of view.

It is not easy to interpret or implement either of the approaches. 'Benefit principle' requires knowledge of expenditure benefits for each taxpayer and the 'ability to pay' principles assumes knowledge of how to measure ability.

The 'benefit approach' ideally can allocate that part of the tax bill which could pay for the cost of public services but it cannot cover taxes required for financing transfer payments and ensuring income redistribution. The 'ability to pay' approach can better serve income redistribution but leaves the provision for meeting cost of public services uncertain. It is the combination of both these principles that are often used for taxation purposes. Wealth taxation and taxation of rent fall in this category. The benefit rationale for the taxation of wealth and economic rents from natural resources on natural resource-based projects (land, water, mining, petroleum, gas etc) is that public services increase the value of those properties or resources and therefore the beneficiaries or the owners of those resources must pay for the public services by contributing to the Government revenue in proportion to the amount of wealth or economic rent they gain. Benefits received are also seen as a measure of ability to pay. Wealth and economic rent also enhances owner's ability to pay and hence the 'ability to pay' rationale is simultaneously used to siphon off part of the economic gains. Other terms that closely describe the concept of economic rent are 'windfall profit' and 'excess return'.

C. RESOURCE RENT TAX: ONE MEASURE OF TAXING ECONOMIC RENT

The Commonwealth (Australian) Government has already passed a legislation imposing a resource rent tax (RRT) on the profits of oil and petroleum projects. The rationale given is that petroleum is a community product and therefore the public should have a 'portion' of the potentially excessive returns that are generated from its exploitation. The idea of a resource rent tax became widely known in Australia during the mid-1970's when Garnaut and Clunies Ross - two well known economists, first suggested a new method for collecting economic rents

and excessive profits. Their proposal is basically an 'excess profit tax' which extracts only a certain percentage of revenues in excess of some pre-determined "threshold rate" of return on invested capital. This scheme came to be known as 'Resource Rent Tax'. Soon the notion received support from the then Liberal Prime Minister and also endorsement from the Labour Opposition, and has now become an important tool of the present Australian Government's policy towards the resource based industries. For the purpose of the maintaining neutrality, the concept of RRT deserves generalisation. In other words, the application of RRT should be extended to all types of resource-based projects judged to be earning economic rents. The mineral industries would be commonly regarded as industries suited to an RRT on this argument. Other candidates for RRT could be gas, forestry, land development, water resources and so on.

Economic Arguments for RRT

The whole issue of resource rent tax has continued to remain highly controversial in Australia from the outset. The debate got particularly escalated with an exchange between the Commonwealth Government and the Australian Mining Industry Council in December 1977 when the Government was actively considering introducing the RRT in the mining industry as a new method of collecting economic rents replacing the old methods. In the past, rents from the Commonwealth and State mineral rights have been collected primarily through a combination of outright sale of leases, ad valorem and per unit royalties, overcharges for transportation and electric power, price controls and export levies. The RRT as a replacement method (of extracting rents) is claimed to have advantages over other forms of taxes, charges, royalties and levies, in that while all other taxation and charge regimes would distort resource allocations, interfere with the natural economics of supply and demand and would lead to less than optimal decisions, the RRT would not.

Basically there are three types of economic arguments generally advanced in favour of a RRT:

- i. First, a RRT is considered by certain economists as 'economically efficient' in that it does not distort resource allocation and does not interfere with the creation of wealth in the resources industries. All a RRT does is smoothly extracts part of the resources wealth, or what might be termed excessive returns, for the Government and it does that without adversely affecting investment. The proponents of RRT thus claim it to be 'neutral' with respect

to private investment decisions. Among those who came to such conclusions are Garnaut and Clunies Ross (1975 and 1979).

- ii. Secondly, there is a widely accepted socio-political opinion that the public or society collectively owns all natural resources rather than private individuals or companies who often are risk-takers in the process of creating values and obtaining returns from those resources and the RRT is a means whereby both the private risk-takers and public can obtain 'fair' shares of the utilisation of those resources.
- iii. Thirdly, other forms of charges such as lump sum fees through auction of resource rights and per unit or ad valorem royalties are inefficient since they yield only a small fraction of the resource return to the Government and also affects marginal decisions of investment.

D. PROBLEMS OF OTHER METHODS OF COLLECTING ECONOMIC RENT

One of the most common and easy way of extracting economic rents from the natural resource rights is by outright sale of the resource right to the highest bidder. This is what is also known as charging "lump sum fees" since the auction of resource rights would yield 'lump sum' amounts. Although such auctioning or 'lump sum fees' provide the Government with a guaranteed and immediate income, it actually leaves the Government without having any 'equity' in the expected future proceeds from the project or resource in question. Recently, the Industries Assistance Commission has particularly argued against such auctioning of mineral resource rights by the Government on the ground that the market does not enjoy competitive conditions as the number of bidders are very few. Also, Garnaut and Clunies Ross have pointed out that Governments usually suffer from lack of good and precise information on costs of production and prices of output of resource projects, and therefore the 'true value' of resource rights. This has the implication that an auction or sale of resource rights which yields only a "lump sum fee" could leave the Government with only a small fraction of the resources' worth. Also, with the outright sale of resource rights or lease, the lessee or the project owner confronts the entire risk requiring possibly a large risk premium to be covered before undertaking any project since the Government is no longer sharing any risk. This may inhibit valuable projects from being undertaken. This is particularly true because, in general, companies or project owners are risk-averse.

On the other hand, if the Government bears part of the risks, then the project owner or the company concerned would be requiring lower risk premium and, therefore, would be more willing to undertake such projects thereby enhancing the value of resource rights. In order to make the Government bear part of the risks it would be necessary to assure the Government that it has some equity interests. It is argued that one form of obtaining Government's equity interest is through 'royalty' collection from companies or projects earning unusually high returns. Further, such a bilateral arrangement would have the following three advantages:

- i. it would ameliorate the bad effects of monopoly control by a private company on vital natural resources;
- ii. it would abate the problems of lack of information or imperfect information on the part of the Government on the prices, cost and value of the resource project; and
- iii. it would reduce the risk-aversion on the part of the companies or project owners.

Although such a 'royalty collection' is not a new notion and has been in Government practice in certain resource areas for quite some time, the actual methods of collection are not appropriate - that is, per unit and ad valorem royalties are considered inefficient because they not only fail to capture entire 'economic rent' but also distort marginal decisions leading to less than optimal output.

E. CENTRAL TASK OF ECONOMIC MANAGEMENT

It may be useful to point out here that the central task of the economic management in the resource-based industries is to maximise the contribution that these industries make to the Government revenue (subject, of course, to the fulfilment of other government objectives). The task has two aspects:

- i. First, Governments must ensure that the resources or resource rights are used in a way that maximise the long term social product or output. This is the optimality condition or the condition of enhancing resource or project values to its maximum possibility.

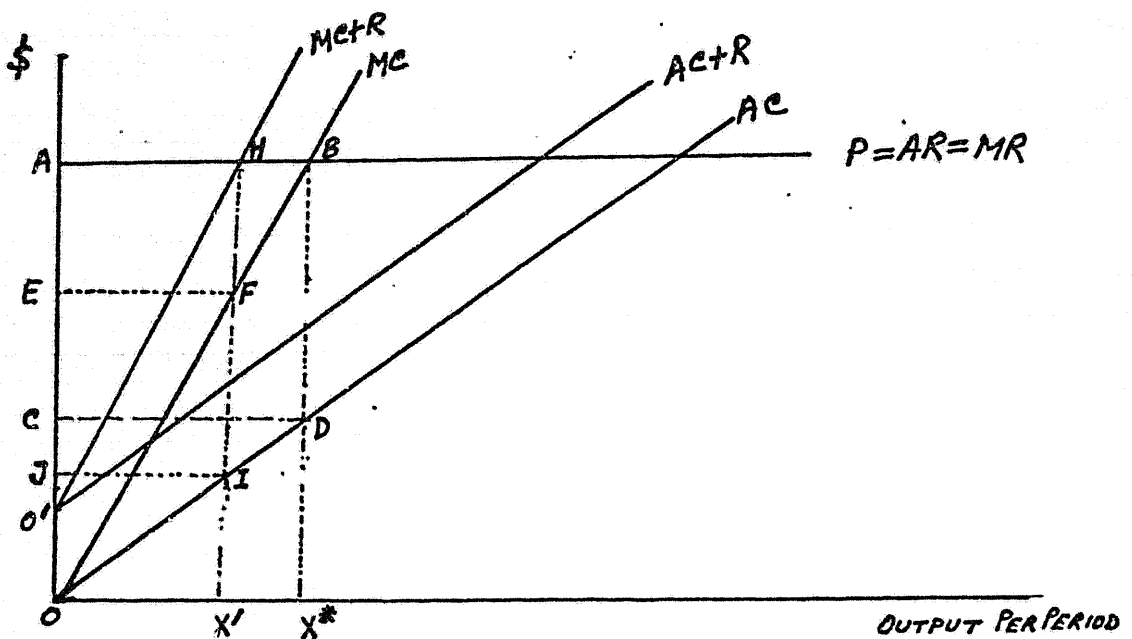
- ii. Secondly, Governments should ideally be aiming at capturing as large a proportion as possible of the benefits generated without reducing the level of activity. This suggests that full rental values or 'economic rent' of the resource in question should be captured.

F. INEFFICIENCY OF PER UNIT AND AD VALOREM ROYALTIES

The major inefficiencies of the per unit and ad valorem royalties are that they fail in both counts. That is, they generate both less than socially optimal output and fail to capture entire economic rent. Following the graphical techniques of Richard Dowell, this is demonstrated below:

RENT COLLECTION THROUGH PER UNIT ROYALTY

(Figure 1)



The vertical axis represents dollar (\$) amounts of costs and prices, and the horizontal axis represents output per period. The average and marginal costs of producing the optimal level of output is OD and OB respectively. We assume the Government imposes a per unit royalty amounting to OO' . This has the effect of lifting up the firm's cost curves to $AC+R$ and $MC+R$.

We further assume perfectly competitive conditions implying both the firm and the Government are price-takers in the market for product X. The demand curve is given by AP. It is obvious that if the resource right is auctioned through competitive bidding it would yield an area of $ABDC/i$ where i is the market rate of interest. But if the value of resource rights is collected solely through a royalty 00 , then the Government revenue would amount to only $AHFE$ per period and the lessee or the firm buying the resource rights would be earning rents worth $EFIJ/i$. Thus, the Government fails to capture the entire rental value with per unit royalty. Also, with the imposition of royalty 00 , the output is reduced from optimal X^* to X which also accompanies a welfare loss of $HBFI$. The above demonstration clearly shows that royalty transfers economic rent to the lessee at the expense of the lessor and distorts marginal incentives that reduces output or value of resources. The exposition of the case of the inefficiency of ad valorem royalty would be analogous.

It has also been pointed out earlier that most auctions of the resource market in Australia, particularly the mineral resource and petroleum resource markets, do not have a very large number of bidders to ensure competitive bidding. No one also really knows the degree of imperfections and, as a result, it is also not known as to how much the Government is missing out through those auctions, or what is the actual worth or value of the resources in a particular sector. The returns are highly uncertain in nature. The crux of the problem really lies in the complexity of the concept of "economic rent", Government's ignorance of what is termed "supply price of investment"¹ and its lack of information of production costs and product prices. Because capturing of full rental value of the resources through pre-designed royalty rates can only be possible when Governments possess perfect knowledge on those things. This takes us to the problem of how to set correct resource rent charges.

G. THE DIFFICULTIES OF SETTING THE CORRECT RENT CHARGES

It has been indicated earlier that the returns in the resource-based industries are highly uncertain in nature, the investors are generally risk-averse and the Government possesses very little information on the actual worth of the resource rights. Thus, like many other Governments, the Australian Government also has to rely on the potential private investors for information about the value of the

resources. The investors who possess superior knowledge and foresight may, in all likelihood, be able to persuade the Government to allow them easier tax treatment. That is why the conventional methods of rent extraction, particularly through royalties, auctioning and other charges which are negotiated in advance of the actual investment, gives the Government a very small fraction of the benefits of successful projects. On the other hand, if there is too much interference from the Government, or the Government sets a very high rent charge without the knowledge of actual production costs and product prices, there is always the possibility of Government losing income or revenue through reduced investment. Therefore, a Government whose objective is to maximise its total revenue through rent extraction often finds it very difficult to do the balancing of the possibility of revenue loss on highly profitable projects through an over-liberal approach to taxation against the possibility of setting rent charges so high that there is revenue loss through reduced investment or deterrence of projects. This problem persists in all cases of uncertainty in profitability even including the case where the Government and investing company share similar information.

We first take the case where the Government and the investing company have identical information on costs of production, prices of products and the "supply price of investment" and there is, of course, the uncertainty regarding future profitability. If the project appears ex-ante to the Government to be a highly profitable one and the Government makes the project or investment subject to ex-ante lump sum rent charges, per unit or ad valorem royalties on production, or proportional taxes on profits, then the 'risk-aversion' of the investor would raise the "supply price of investment". In other words, ex-ante or prior taxes that are proportional or in some way related to the volume or value of production or to company profits, raise the risks of failure or of unacceptably low returns and that in turn raise the expected after-tax profit level that would be required to induce investment. Thus higher the supply price of investment or the expected after-tax profit level required to induce investment, higher the possibility that the investment will not be undertaken. The danger of imposing high ex-ante lump sum charges (through auction) and royalties is that it may deter the very investment and Government may not get any revenue at all.

If, on the other hand, the project seems ex-ante marginal one, that is one which is capable of reaping low profits and the Government sets the tax rate or royalties at negligible rates and then later on ex-post the project turns out to be a highly profitable one then the Government misses out from a big chunk of the revenue.

Therefore, it is really a question of devising the correct system of taxation or charges that does not add to the risk of failure or of unacceptably low returns and yet is capable of extracting a big share of revenue for the Government if the project turns out to be ex-post highly profitable.

Let us now look at the case where the investing firm has superior information than the Government on the price of product and costs of production and the "supply price of investment". This case is even worse for the Government in that here, even in the absence of any risk-aversion of firms, the Government may, through ignorance, be forced to negotiate or accept revenue arrangements with the firms that would possibly leave expected profits higher than the supply price of investment, thus depriving the Government of a large part of the revenue. The investor is also likely to be better informed on the factor of 'risk-aversion' which affects investors' supply price of investment.

In general, risk-aversion is likely to play an important role whenever the particular investment is a large part of the total operations of the firm. Because the negative value of total failure could have a major adverse impact on the company personnel and therefore is weighted more than the positive value of unusually large profits. Therefore, if there is any risk of large failure - that is, if large failure is one of the possible outcomes and even though that outcome has a very low probability (low risk), the company will not be willing to invest under any ex-ante arrangement that will leave the expected after-tax profit equal to (or just covering) the supply price of investment.

Secondly, even if the expected after-tax profits are significantly above the supply price of investment, but that there is a large profitability of the outcome that profit will be less than the supply price of investment then investment will not be undertaken with any ex-ante arrangements.

Besides, investors also make an assessment of political risks and stability of taxation systems and usually they do it by evaluating the ex-post treatment of the similar investments in the country. Also, the ex-post adjustment in project affect the ex-ante expectations of the after-tax profitability of future projects. Inconsistent tax treatment might add to uncertainty and raise the investors' supply price of investment and therefore lower the rent that the Government can expect to extract.

It is to the advantage of the Government to delay the tax negotiation and investment agreement with the firm as long into the exploration and assessment period as possible so that the Government can have better knowledge regarding the production costs and the value of resources. But the investor, on the other hand, would be unwilling to invest heavily in these activities until it is certain of the terms under which it will be developing the resources. Direct Government involvement in exploration and assessment may be one option but may not always be feasible.

Another factor which makes it very difficult to devise the appropriate tax system is the uncertainty in production costs. Production costs per unit remain uncertain even after detailed feasibility studies and, in many cases, after production has commenced. Sample tests suffer from imperfections and the magnitude and quality of the resource is not easy to determine until full exploitation is completed. If there had been certainty about per unit production costs, then the tax authorities could have worked out the level of prices that would attract investment and, in that case, the entire income of the investor above that price level could have been extracted efficiently without loss of any rent. But such circumstances usually do not occur particularly because the investors would always try to increase the Government's uncertainty about production costs and thereby increase their rent earnings.

Thus, in the world of uncertainty about pre-tax profitability, cost and prices, a simple price-based tax system is inadequate, argued Garnaut and Clunies Ross. According to them, in order to be able to reap a major proportion of the economic rents, Governments should base their taxation system on both costs of production and prices considered ex-post. The tax system prescribed by Garnaut and Clunies Ross, known as the 'Resource Rent Tax', is one where the tax rates vary with the actual rate of returns.

H. THE METHODOLOGY OF RESOURCE RENT TAX (RRT)

As defined by Garnaut and Clunies Ross, "the resource rent tax is a profit tax that begins to be collected when a certain threshold internal rate of return on total cash flow has been realised".

The RRT is assessed each year on the project's annual "net assessable receipts" (NAR) which, in simplified terms, is the sum of all receipts less all payments in respect of the establishment and operation of the project. In the Garnaut and Clunies Ross method, the NAR is calculated as the excess of all "assessable receipts" over all "deductible payments". The assessable receipts refer to all receipts of the company other than the receipts which are in nature capital provision or capital repayment. Such receipts may include receipts from sale of old depreciated or obsolete assets but would not include receipt of shareholders' funds or any loans or loan repayment receipts. The "deductible payments" refer to all payments by the company other than the payments which are in the nature of capital provision, capital repayment or rewards for provision of capital. Such payments may include payment of any tax other than the RRT, but would not include loan repayments, payment of interest, dividends and bonuses.

The basic principle of RRT is to, first, take a 'threshold rate' of say $x\%$ (which could be 10% or 15% for example)² as an interest rate and then each year calculate the value of net assessable receipts from the beginning of the project at that interest rate. In simple terms, the process involves taking the accumulated value of NAR at the end of the previous year, then raising that value by the threshold or interest rate and then adding the raised accumulated NAR value to the current year's NAR value to obtain the current year's accumulated NAR value. This last quantity is used for tax purposes. This accumulated NAR could be both positive and negative. Since the first few years of the project life cover initial investment, the NAR, and therefore the accumulated NAR, are likely to be negative. No tax would be collected in any of these years when accumulated NAR is negative.

As soon as the accumulated NAR of a particular year becomes positive, it gives an indication that the Internal Rate of Return in excess of $x\%$ (ie. the threshold rate) has been realised on the funds invested in the project, and therefore under the RRT system the excess returns (or the positive accumulated NAR) would be taxable at say, $a\%$ (which could again be 50% for example).

In all subsequent years, until the current year's accumulated NAR is once more negative, it is the current year's NAR and not the accumulated NAR which is taxable at $a\%$.

If the NAR of any subsequent year, n , or consecutive years ($n+1$, $n+2$ $n+m$) turn out to be negative again, no tax would be collected in those years but the

accumulated NAR must be calculated. In year n the accumulated NAR would be same as NAR of year n . But to arrive at the accumulated NAR of year $n+1$, the accumulated NAR of year n would be raised by the interest rate and added to the NAR of year $n+1$. The process continues until again a year is reached when the accumulated NAR is positive.

In the year the accumulated NAR becomes positive, it is the accumulated NAR which is taxed at $a\%$.

In all subsequent years, showing positive NAR, it is that year's NAR and not the accumulated NAR which would be taxable at $a\%$. This continues until NAR again becomes negative in which year no tax is collected and the sequence is repeated.

These operational methods could be extended to cases where the authority decides to tax the returns beyond a higher profit-rate thresholds, say returns in excess of $y\%$ at a higher rate, say at $b\%$. Operations would be identical except the fact that now $y\%$ (say 20% for example) is used as the interest rate or threshold rate instead of $x\%$, and that the tax rate used is $b\%$ (say 25% for example) instead of $a\%$ on the additional return. The total effect of the system would be to tax the company returns or profits in excess of $x\%$ (after company tax and royalties), but not exceeding $y\%$ at $a\%$ and returns in excess of $y\%$ at a rate of $(a+b)\%$. If the tax authority considers it appropriate, further scaling could be introduced so returns in excess of say $z\%$ could be taxed at a rate of $(a+b+c)\%$.

I. FEATURES OF RESOURCE RENT TAXATION (RRT)

One distinctive feature of the RRT in contrast to other similar forms of taxation is that under RRT, all costs and receipts are accumulated at a specified interest rate.

The RRT also turns out to be a system of progressive taxation that relates very closely to the concepts that are usually applied by investors in the evaluation of their investment projects. While a RRT applies a particular threshold interest rate on the year's accumulated net assessable receipts to arrive at a taxation decision, the investors use similar discounted cash flow methods to arrive at an investment decision.

The RRT is also regarded as a company profit tax with the following features:

1. no deduction for interest payments from taxable income is allowed;
- ii. an immediate 100% depreciation or amortisation of all capital expenditures can be made, thus making no difference in treatment between current expenditures and capital expenditures; and
- iii. an unlimited carry-forward of losses, bearing interest at a specified rate.

A very striking advantage of the system of RRT provides is that while other forms of rent extraction such as lump sum fees (through auctioning), per unit or ad valorem royalties have distorting effects on resource allocation, and fail to capture entire rent, the RRT is claimed to be both neutral in its effect on investment decisions and optimal in its rent collection.

In fact, if the tax authority can appropriately fix the threshold rates, a very large amount of tax can be collected without significant disincentive to new projects or expansion of existing projects. Of course, to ensure that there is no opportunity for avoidance of taxation by the investors through variations in timing of expenditure or sales, the tax authority must keep the highest threshold rate lower than the discount rate used by the investors.

The RRT system also precludes the investing companies from exploiting the Government's relative ignorance about costs and prices because it is based on revealed profitability.

J. THE PROBLEMS OF IMPLEMENTING A RESOURCE RENT TAX (RRT)

1. The implementation of a RRT puts an additional administrative cost and responsibility on already heavily burdened taxation offices. The people in the taxation department would have to learn to operate the new system. Although the accounting task itself is not too difficult, the rational economic principles suggest that the resource projects individually must be large enough in terms of potential profitability to justify the additional administrative costs associated with the application of the system in particular case.

2. Since the purpose of a RRT is to tax a project's "economic rent" or the return over and above what is necessary to make the project competitive, it would require that the taxing authority must be able to calculate the competitive rate of return or what is also termed as the 'normal profit' level for each particular project or class of projects, based on the risks involved in it. The determination of this so-called 'threshold rate of return' for each individual project, beyond which RRT begins to be paid, can prove to be quite cumbersome.
3. Under the existing forms of RRT, the Governments (including Australian Government) do not underwrite projects or pay tax refunds which earn less than the 'threshold rate' of return. In other words, the Governments apply RRT only in those projects which are earning positive economic rents. It does not require the taxing authority to take its proportion of the economic rent if they turn out to be negative. This fundamental asymmetry in the RRT's handling of economic rents may discourage some investment as the arrangements imply that the Government is willing to take the 'fair share' of the good outcomes but not of the risks.
4. The implementation of a RRT could involve unnecessarily large amount of work and information collection because of the fact that RRT is project-based. It thus requires whole new set of taxation rules to determine project-by-project definition of taxable income.

Since under RRT system, tax is assessed on project-by-project basis rather than on the aggregated outcome of all projects of a company, it may well happen, for example, that a company, which has eight resource projects earns no aggregate economic rent but still ends up paying RRT on the four most profitable projects.

5. Inflation on periods of changing prices could pose some problem for the construction of a RRT. If the rate of inflation were fixed and known in advance, then it would present no problem as then the 'threshold rates' could just be raised by the inflation rate. But since expected rates of inflation do vary overtime, it is likely that the investor's "supply price of investment", which is expressed in nominal terms, would vary accordingly. In order to make allowance for this possible adjustment of supply price of investments, the 'threshold rates' could be made related to some international long-term lending

rate, which although could be allowed to vary from year to year must be settled at the time of agreement or beginning of the project as fixed for the life of the project. Such a method is advantageous to the Government in times of rising bond rates and to the investor in times of falling bond rates.

6. One important feature of the system of RRT is that since tax is based on ex-post profitability, the revenue starts accruing from the later years of the project. This could provide to be a disadvantage to the Governments, particularly to those which do not have sufficient access to international capital markets. Also greater expected revenue could only be achieved at the expense of greater uncertainty about receipts from particular projects.
7. It is very important during the implementation process that the tax authority strikes a fine balance between the possibility of deterring socially useful investments and the possibility of foregoing genuine rent collection by correctly or appropriately setting the 'threshold rates' and the tax rates. The importance of this balance is particularly stressed because of the following mutually-opposing factors at work:
 - a) If the highest 'threshold rate' set is higher than the investors 'supply price of investment' in a particular case, it will provide opportunities to the investor to avoid the tax by just rescheduling his investments. Also greater the steps in the progression of the tax which occur above the supply price of investment in a particular case, greater will be the avoidance. Therefore, it is in the interest of tax authority to keep the 'threshold rate' and tax rate at low level when they are above investor's supply price of investment.
 - b) On the other hand, higher the 'threshold rate' at which RRT begins to be applied, lower will be the investor's 'supply price of investment' because of risk aversion factor. This means more willing the investors will be to undertake the investment, the higher the positive difference (ie. threshold rate > supply price of investment). In other words, a given amount of rent tax is less likely to deter socially useful investment, higher the threshold rate from which the tax is applied. Therefore, on this argument, the tax authority must keep the 'threshold rate' and the tax rate at a high level.

- c) Again, if the tax rate is set at very high level, it will leave very small after-tax cash flow and investors will lose incentives for managerial efficiency. Firms will not employ best manpower in a major project that gives negligible profit. If the Government wants resource projects to obtain best value through the use of managerial efficiency, it must keep the 'threshold rate' and tax rate at a low level.
 - d) The Government always possess imperfect information on the investors' 'supply price of investment' in a particular project. This, in turn, is due to its ignorance on the investors' views or weightings on possible range of outcomes, likelihood of their occurrence and on investors' attitudes to risk. This suggests that a Government has to be very careful in avoiding the possibility of ending up with an inappropriate 'threshold rate'. It must tailor the 'threshold' and tax rate to individual project needs to reduce errors. But such a task is administratively difficult.
8. Since under RRT the net losses and outlays on investment (expressed as negative net assessable receipts) in previous years may be accumulated at a specified "threshold interest rate" and offset against the net assessable income (expressed as positive net assessable receipts) in the current year (if they have not already been used in this way to offset income in a previous year) to arrive at the tax amount of the current year, it provides an opportunity to investors for "tax-holiday". Also under the RRT, separate taxes are levied at more than one threshold interest rate. These characteristics of RRT system enable the investors to avoid paying taxes in the early years if they incur development expenses which could be offset against the profits of early years, or if their profits are unexpectedly low in early years. But then it also allows the Government to ensure that if profits turn out to be very high eventually, it would extract a very high percentage of that in tax without significantly affecting investment decisions.

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