"Historical Developments of Log Pricing Policies in British Columbia Canada and Queensland Australia – International Similarities and Differences"

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Governments that own renewable natural resources often set pricing policies that achieve multiple objectives including efficiency, economic development, employment, investment, sustainability and environmental protection. In the forestry industry, multiple objectives have been pursued to achieve government policy outcomes. Historical developments in pricing policies give insight into the extent of efficiency and rent collection. This paper addresses the issue of historical pricing policies for both British Columbia in Canada and Queensland in Australia, giving an international perspective. Similarities and differences of these pricing and supply policies in the respective countries are assessed in a historical perspective. Parallels are drawn and differences highlighted in two systems that appear similar but different in nature.

INTRODUCTION

Some Background

Pricing policies for forest products in both Canada and Australia depends heavily on the ownership of the forest estate, the size of the industry, the importance of employment in downstream industries and market destination and demand. To put these two forest producing authorities in perspective some initial comparisons are drawn.

While the forestry industry is important for Canada as a whole, most of the softwood lumber is derived from forests on provincial crown land in British Columbia. BC's forests are extensive covering 56.14 million hectares (ha), 6.4 million (14 percent) on the Coast and the remainder in the Interior of the Province. Its economic, social and environmental impact is significant considering that in 1995 some 83,000 people were directly employed in forestry activity in British Columbia, 65million cubic metres of timber products was harvested that generated $C16.8 billion value of timber shipments (Canadian Forest Service 1996a). By 1998, the timber harvest in BC had fallen to 56.8 million cubic metres. Most of this lumber is derived from first commercial harvests from natural stands on crown land.

In contrast, Australia's forest estate approximates 41.8 million hectacres, 97% of which is native forest. Total harvest from Australia's forests in 1991/2 was 17.1million cubic metres. Of this over 10 million cubic metres were from hardwood species; the remaining 7.1 million cubic metres being softwood mainly from the 646,000 hectares of government-owned softwood plantations and the 230,000 privately-owned softwood plantations. With most of the softwood plantations in the southern temperate climate states of Australia and of the *pinus radiata* species, the more tropical state of Queensland softwood plantations are predominantly Crown-owned, of the *pinus carabea, pinus elliotti and pinus aracurea* species, and grown on the eastern sandy coastal lowlands. Some 167,000 hectares of softwoods have been planted in the state of Queensland since the 1930s from which 1.3 million cubic metres of timber were harvested in 1995/6 and employs 2000 people directly and a further 15,000 indirectly in the industry. The Queensland Department of primary Industries – Forestry intends to increase the softwood plantation estate to have a sustainable annual yield of 1.8 million cubic metres by the year 2010 (DPIF,1998,).

Softwood harvesting from both public and private lands in Queensland are relatively small when compared to the size of the British Columbia industry. Hence the importance of pricing issues is likely to have a greater aggregate impact on resource allocation and investment incentives in BC than in Queensland. Nevertheless it is interesting to assess the developments of log pricing policies in both these countries and the objectives they were designed to achieve.

Supply Conditions

British Columbia - Canada

With over 94% of the forests in BC Crown-owned, public policy determines access, cutting rights and prices paid for having access to and cutting government – owned timber. The system that has evolved over the past century is the forest tenure system which guaranteed access to cutting areas by cutting authorities in exchange for investment in manufacturing facilities by mill owners in the province. **Leases** were issued in 1901-3 to encourage the development of the pulp and paper industry. Competition for timber leases existed as early as 1891 when leases surveyed by the government were put out to tender and competitive bidding made mandatory (Drushka, 1999).

A long term timber licencing system evolved with a series of **licences** being granted as early as 1884 but by 1907 this licencing system had expanded with the proliferation of some fifteen thousand "Special Timber Licences". No more licences or leases were issued after 1907 when a new *Forestry Act* was passed allowing for a new **tenure** system through **timber sales**. Rent and royalties were to be paid in the form of a "stumpage" charge under an appraisal system that estimated the value of timber to be extracted from the government forest. These timber sales on appraised valuation increased steadily until World War II, after which "**Tree Farm Licences**" became widespread and "Timber Sale Harvesting Licences" replaced timber sales. As Drushka (1999,165) states "*..timber was now sold through these new **tenures** at appraised stumpage rates."* As the licencing system expanded the amount of timber acquired by competitive auctions declined dramatically. Table 1 details the characteristics of the licence system in BC forestry. These events indicate that over

the development period of the BC Forestry industry cycles of competitiveness and regulation were experienced as the Crown sought to extract various proportions of the economic rent from the forest industry.

Table 1. Licencing Characteristics in BC Canada

Licence Type	Mm^3	percent	base	Duration
Forest Licences	39.2	50.2	volume	15 years
Tree Farm Licences	12.9	16.6	area	25 years
Timber sale licences SBEFP	10.2	13.1	area	2 years
Licences royalty bearing	4.5	5.8	area	Until timber removed
All other licences	3.0	3.8	various	Various
Total for Crown Land	69.8	89.5		
Private & other land	8.2	10.5		
Overall Total	78.0	100.0		

Source: Adapted from Scarfe, B. L. (1998) Table 8.1.

This Licencing (tenure) system remains today. It is the major source for acquiring cutting rights to crown land timber in BC with many licences being for 25 years or more. While some 13% of timber is still sold by auction through the BC Timber Sales method, tree farm licences are still the major source allocating crown land logging access rights (Wang and Wilson, 2004).

Queensland

When plantation softwood forests were first established in Queensland in the 1930s, nearly all were established on crown land and licences were issued to mill processors generally closely located to the plantation for harvesting rights. Much of the timber taken from crown land during this period was from public native forests, much of which was of the hardwood variety. But softwood plantations promoted under various State and Commonwealth incentive schemes were developed to eventually replace logging in old growth forests. In 1999 there were two broad types of leases for forest management and commercial timber production:

- Forest and timber resource remain a public asset – ownership is invested in the Crown
- Rights to the timber are "conveyed" to the lessee - conditions are less restrictive

Many of these licences were originally long-term for periods up to 25 years with quotas for cutting rights to incumbents being renewed automatically provided certain conditions were met (ABARE, 1992). As these contracts expired shorter contract periods were negotiated with lessees and in some cases opened to competitive

bidding. By 1999, about 23 contracts were on issue for forest management and harvesting of softwood plantation timber varying in duration from 3 to 25 years.

Following a period in the early 1970s when competitive bidding on an auction based system operated, auction sales were replaced by a system of non-competitive allocations. An equitable system was devised for allocating the forestry resources to existing sawmills on the basis of a formula involving the average annual cut by individual mills of Crown and private timbers over the 4 years to June 1974.

These allocations were reviewed every five years and conditions were reassessed. In the 1980s allocation holders were invited to enter into 20 -25 year supply agreement contracts with the Crown which was to guarantee security of access to the timber resource (Ryan, 1992, Quayle and Cox 2001).

Similar to the BC case, Queensland also initially experienced a period of competitive bidding for the softwood plantations. Following collusive behaviour by buyers the Queensland Government imposed a system of **allocated quotas** on a licence basis.

Collecting the Rent

Ricardian rent arises when variable inputs such as labour are applied to a fixed factor such as land. When a factor of production such as land is fixed in supply the output from additional units of the variable factor input will eventually decline. The more productive the quality of the fixed factor the greater will be the rent. The concept of rent may be applied to forestland. If two sites have equal access costs, one site may be more productive than another if it yields more timber and therefore it will have a higher Ricardian rent.

Ricardian rent in forestry arises from the productive nature of the land and hence belongs to the owners of the land. The amount of rent to be collected from forestland is also determined by the price received for timber. As the price of timber rises and the rent will also rise irrespective of the quality or the productivity of the land from which the timber is harvested.

Rent arises whenever the supply of a factor of production is fixed. In the case of natural resources and forestry the timber supply is fixed in the short run for both native forests by nature and for plantations by the allowable annual cut (AAC). Should the price of timber rise any windfall is a rent that accrues to the forestland owner. Capturing the rent by the land owners will not affect the behaviour of the firms accessing the timber as it represents a surplus above and beyond that which is required for the firm to stay in business (Grafton, Lynch and Nelson, 1998).

Pricing Policies – Similarities and Differences

Canada

A number of different pricing formulae have been used by the BC Forest Branch to collect the rent from the crown-owned forest resource including: an appraisal system

(residual pricing), Comparative Value Pricing and Market Related pricing. Prices or stumpage have been set to achieve a number of socio-economic and political objectives. These objectives were not necessarily aimed at achieving economic efficiency in the cut rate and assuring maximum sustainable yield with environmental concerns. They were set to achieve a desired level of financial funding for the BC government, the encouragement of employment in the second largest industry in the province, and to spur investment by processors to assist with the development of the province. The result was that economic efficient pricing structures were rarely applied.

The concept of stumpage was introduced to refer to the value of the forest resource after accounting for felling and transport costs. In the case of private forest owners it referred to the price that a logger would pay for the timber before it was cut implying that the price offered included rent or stumpage, felling and transport costs.

The Appraisal Pricing System

The appraisal pricing system introduced in the 1950s was applied to large tracts of licenced crown-land timber was introduced to establish the rent component of the stumpage payment. Under this system which could be thought of as *residual* pricing where a tract of forest land was valued by the owners of the timber (BC government) estimated the value of the timber and subtracted the estimated cost felling and transport leaving an *upset price* which set the lowest price bound that the Crown would accept for the timber.

Over the years distortions in the submitted felling and transport costs and final lumber recovery charges meant that the appraisal system continually undervalued the forest resource despite the fact that for many years it provided an increasing source of crown revenues to the province of British Columbia. By the early 1980s it was considered that the appraisal system so undervalued the resource that it was considered as a subsidy by the United States of America being the largest export market for processed timber output.

In the late 1980s the BC government replaced the appraisal system with a complex C*omparative Value Pricing System*.

Comparative Value Pricing System

The CVPS was a complex multi-layered stumpage fee structure that was designed to [3]increase the revenues collected by the BC government from the forest estate. Introduced in 1987 the CVPS was a response to the demands of the Coalition for Fair Lumber Imports of Canadian timber into the United States. Its primary objective was for it to be seen that the BC government was charging a sufficiently high price for timber from crown land to avoid the assertion that this resource was being subsidized for export purposes.

Unlike the appraisal system the CVP system was highly complex and based on an *ad valorem* approach being linked on a percentage basis to the final selling price of processed timber on a lagged basis Annual surveys of harvesting costs from loggers were used to establish the *relative* stumpage charges by area. Under this system all

species in the same stand were averaged together to determine the stumpage rate. "Target Rates" of prescribed amounts of revenue to be collected were set and a formula based on Lumber Price Index in the Coastal and Interior areas of BC assembled by StatsCan Canada were used in the calculations. The relationship was prescribed in the unconventional non-linear function form:

Coast $TR = \frac{INDEX}{138.5} \times \$10.59$ if index ≤ 160 …..(1)

$TR = \$12.23 + \frac{INDEX - 160}{25} \times \$9.73$ if $160 < INDEX \leq 185$ ……..(2)

Similar formula was used for the Interior region of BC forests using where the index value used was that of the Statistics Canada Softwood Lumber Price Index for the Interior region.

Several adjustments were made to the system allowing for super-stumpage to be included and many allowance factors to be introduced. Target Rates were then estimated for the average grade or yield per stand using the **Mean Value Index** and the estimated average operating cost for that stand size, volume and grade. The mean value index was calculated as the "*volume-weighted average of the value indexes for all cutting authorities on which harvesting has taken place during the recent twelve months periods* (Ministry of Forests,1998). The mean value index for the Coast is based on data from some 500 cutting authorities and that for the Interior on approximately 2000 cutting authorities. For any specific stand of timber the **stumpage rate** will be higher or lower than the average if the value of the timber in the cutting authority is estimated to be more or less valuable than the average. Rates are then adjusted through time depending on changes in the lumber index for the Coast and Interior respectively. By 1998 after allowing for silviculture costs, milling costs and other developmental costs stumpage rates for low value stands were estimated at \$8.35 m^3 and high value stands were valued at \$55.00 m^3.

Adjustments to the CVPS

Further refinements occurred in May of 1998 when the adjustment price index was broadened to include a weighted average of both lumber and chip selling price on the Coast and the Interior. Using dollar values of product groups in each region weights were prescribed as identified in the following table:

Table 2 Coast region of British Columbia dollar value weights

Lumber	$	1,654 million	90.3%
Chips	$	178	9.7%
Total	$	1832	100%

Table 3 Interior Region of British Columbia dollar value weights

Lumber	$	3,121 million	88.0%
Chips	$	424	12.0%
Total	$	3,545	100.0%

Source: Ministry of Forests, British Columbia ,Stumpage Charges, 1998.

These weights were included respectively into the aggregate weighting index devised for adjusting the stumpage rate on an annual basis and applied to the aggregate index formula below.

$$I^{i}_{agg} = \left(I^{i}_{p} * w^{b}_{p} \right) \quad \ldots(3)$$

where p = product type p = 1,2

w^{b} = value weight in the base period 1992

Equation 3 was then continually upgraded to be used in equations 1 and 2 to estimate the target rate of revenue collection per cubic metre or the stumpage rat over successive time periods..

This CVPS will still the mainstay in timber pricing of BC crown land timber, is gradually being influenced by more direct market forces through the process of auctions. Hence, after some 50 years a reversion to market force analysis is apparent in the new *Market – Based Pricing System*.

Market Based Pricing System

The Ministry's Small Busines Forest Enterprise Program was introduced in the early 1990s will the intent of opening crown land forests to small scale loggers through an auctioning system. Initially, 13% of the allocated allowable cut (AAC) or 10 million cubic metres was assigned for SBFEP forestry licences (Scaife, 1998). Much of the additional revenues collected from the auction system were disbursed to finance the Forest Renewal BC program that incorporated new codes of forestry practices and increased costs. Achieved SBFEP prices were used as a weight in the target rate equations to adjust the expected stumpage rate.

In 2004, the SBFEP evolved into a new licencing system named **BC Timber Sales (BCTS).** According to their vision statement BCTS develops and sells publicly-owned timber to establish market prices and optimize net revenues to the Crown (BC Ministry of Forests, 2003).

Under the BCTS sales system individual loggers and millers gain access to crown forests for timber purchase through an auction system that establishes a market price for the resource. A cruise of the characteristics of the stand is carried out to establish the quality and yield of timber from the stand, recovery rates are determined, as are logging and haulage characteristics. Previous winning bids of auctioned stands are included to estimate expected bid values for future forest auction lots.

Using 248 observations and correcting for hereroskedasticity most various were statistically significant in determining bid price of crown forest stands for logging. Previous selling price, volume per hectare, and number of bidders were particularly

significant variables in determining expected price levels. This system is sometimes referred to as **transaction evidence pricing system** (Ministry of Forests BC,2004).

It is the intent of the Ministry of Forests BC to use the evidence from transactions to determine the stumpage price for the timber harvested under long-term tenures. This philosophy reflects a return to market place pricing and a movement away from strong arbitrary regulated pricing.

Queensland's log Pricing System

Pricing policies for softwood timber from crown-owned plantation forests were not designed originally to maximize the collection of the economic rent; rather they were implemented to achieve other economic / political and social objectives. Encouraging investment and employment in the forestry industry, redressing the imbalance of logging between native forests and plantation forests, and a secure and guaranteed supply of timber resource to processors in down-stream industries. From this perspective softwood plantation timber pricing policies in Queensland in the late 1960s early 1970s is little different to that experienced in British Columbia. Further, it was also claimed that the original pricing of timber involved a subsidy through the limited auctioning system and lack of bidders at sale time.

When large parcels of timber in the crown-owned softwood plantations became available for logging, allocations on a long-term tenure basis were assigned giving logging rights to that company with the contract. Often these contracts were for periods up to 25years in duration with logging volumes determined according to economic conditions and prices negotiated accordingly between logging contractor and the crown as supplier. Little direct auctioning of the timber resource occurred to establish market prices and royalties or stumpage was set in light of "current economic conditions". Prices had little to do with promoting economic efficiency in resource allocation, encouraging long term investment into the forestry industry, or sharing the distribution of the resource rent equitably. Royalty payments had little to do with promoting economic efficiency and market forces for allocating resources were ignored.

Pricing had lurched from a fragile ineffective market auction system to a stabilized regulated supply and negotiated price arrangement. This is not dissimilar to circumstances that arose in the British Columbia system half a century earlier. The Queensland pricing system evolved into the **residual stumpage assessment system.**

Residual Pricing

Residual pricing was again similar to the BC residual pricing mechanism. Under the residual pricing system an upset price was established for auction-based parcels of timber but this system soon collapsed and was replaced in 1975 by a non-competitive allocation system with individual price negotiations with the contract holder.

In 1985 a variable royalty system was introduced to reflect variations in the quality of different stands of timber. Under this system royalty payments depended on average log volume from a stand, haul time and price of the timber at the sale gate. Sawmill

recovery costs were included in the calculations as were log characteristics drawn from historical records. In effect this system varied the royalty payment based on extraction costs and processed timber prices.

This system too was open to abuse. The stumpage royalty was squeezed as the costs of extraction increased and purported recovery levels fells and processing costs rose. After a number of reviews it was decided to move to a **propositional call tender pricing system**.

Propositional Calls

In the mid 1980s the propositional Call system was introduced. Under this pricing system long term supply agreements of up to 20 years were negotiated giving guaranteed access to supply. Five yearly price and supply condition reviews were to be undertaken. Any surplus resource or unused allocation was to be put to public auction as a propositional call system.

Like BC, Queensland was dabbling at the margin in determining market prices for timber from crown land while maintaining a tenure system for its buyers. This system too was open to abuse as it often was the case that there would be only one tender for the timber auction lot and frequently that would be the processors co-located to the forest plantation.

Eventually further adjustment methods were introduced to make the price of tenure holdings more responsive to market conditions. In 1995 following further reviews a number of recommendations were put forward including,

1. long term security of supply to be retained to encourage investment
2. pricing should be market based with open competitive purchasing
3. a wind back of the administrative regulated pricing system

Again features of the BC stumpage system were adopted in that a small surplus supply of contracted logging sold on the open competitive market was to be the major determinant in forming prices for most of the cut from tenured contracts.

The Price Adjustment Model

In 1998 QDPI-F converted maturing long-term tenure rights into shorter term five year and two year contracts with price adjustment clauses on a three month and six month basis. These price adjustment provisions were to follow a price index formula similar to the BC model (only in a simplified form) and were to include a market Factor Adjustment system. The formula for adjusting contract prices for softwood plantation forest output was as follows:

$$\mathbf{P_{t+1} = (P_t + WWI) + FAS}$$

Where WWI = Wood Weighted Index based on the Australian Bureau of Statistics structural timber price index (Quayle, 2004)

And FAS = Factor Adjustment System

The WWI factor and the FAS were weighted on a 60% /40% basis to influence price changes in the following quarterly period. The FAS was arbitrary in that it was a subjective measure dependent on developments in the markets, the overall state of the economy and the level of employment. Underlying these factors was a desire by the Crown to collect an increasing share of the rent at the expense of the millers.

Conclusions

Many of the pricing policies implemented by the BC government throughout the past 100years are highly similar to those implemented by the Queensland government in Australia. Policies of access, long term tenure policies, guaranteed supply arrangements, encouragement for investment in the province and employment objectives were all similar in both countries.

As the forestry and processing industries were established policies towards long term tenure agreements were modified in both BC and Australia. A considerable difference between the two sovereign states was that in Australia, the deliberate policy to move from native forest harvest access rights to one of softwood plantations marked a difference in policy direction.

As the international log market and lumber markets become more integrated pressures for more economic imperatives are overriding social, environmental, and ecological concerns once embedded in the forestry industry. It is therefore of little surprise to witness a gravitation of forest policies towards similarity in most timber producing sovereign states.

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