



Private and public timber production: How markets and political institutions matter[☆]



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ABSTRACT

The aim behind this paper was to find a logical explanation for the simultaneous existence of public and private timber enterprises based on an individual, subjective benefit-cost weighting made in the context of different institutional arrangements. In the section on modeling, the effects of the separation of forest ownership and forest management, and of private and public ownership sharing are studied. The main difference between public and private timber enterprises relates to the exit clause. Whereas public timber production is characterized by a strong exit clause, in the case of private timber enterprises the individual stockholder can exit almost without constraint. The strong exit clause in public enterprises increases the liability as technique for hedging the risks of timber production. This becomes more pronounced the greater the degree to which the public fiscal decision is separated into a production and a liability decision. The reason for this is that where there is a higher degree of public decision making an unconstrained majority rule applies, which also leads to a transfer of liability to a minority. Another factor is that the limited time perspective involved in public choices does not outperform the advantage of lower interest rates associated with public timber production. The strong exit clause in public timber enterprises also provides an opportunity for the forest manager to increase the forest rotation length. The paper concludes with some remarks on how the results obtained from the simple public choice model employed in the study are applicable to a representative democracy.

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1. Problem setting and a note on the method

Observations show that in democratic states public timber production represents a considerable part of overall timber production. At the same time, the production of timber by public forest enterprises is often deemed to be inefficient. Are we really to assume that individuals act irrationally when making the choice among different institutional arrangements?

As institutional arrangements such as public and private timber production are not fallen from heaven - in democratic states they are the result of voluntary agreements among individuals - we must ask why individuals choose to adopt inefficient institutions for the production of timber.

Individuals choose between different institutional arrangements, with the aid of an individual, subjective weighting of the benefit-costs relation, so as to achieve their own objectives. This gives rise to the following question: under which circumstances is the public production of timber of greater net benefit to these individuals than the private production of timber? The focus of this paper will be on providing the answer to this question.

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In this paper I suggest a logical derivation of the existence of different institutional arrangements as a result of individual benefit costs weighting, as explained in detail in [Buchanan \(1999a\)](#). The analysis presented in this paper does not sketch any historical development of public and private forest enterprises. Rather the method applied is a conceptually comparative evaluation of alternative institutional arrangements from the perspective of the individuals involved.

Although the public production of private goods can be widely observed in the economies of modern democratic states (e.g., [Hinds et al., 2004](#): 286 et seq.), I have selected timber production because of its suitability in demonstrating the dichotomy of market and political institutions ([Buchanan, 1999b](#)), and for its inherently entangled character ([Wagner, 2010](#)).

An important part of the world's timber is exchanged through markets. However, as outlined above, timber is produced and supplied through both private and public enterprises. Some of the private forest enterprises are large stock companies, where several thousand stockholders have pooled their resources to vast amounts. Given this 'publicness' of private ownership, what then is the meaning of publicly owned? I hope this paper contributes to a better understanding of the entangled nature of private and public institutions in democratic societies.

To provide a logical derivation of the circumstances under which public timber production is preferable to the private production of timber, a stepwise change to the pertinent institutions will be organized. The starting point of this paper is the Faustmann model ([Faustmann, 1849](#)),

because it provides a well-developed economic analytical framework to study timber production with the help of the analysis of forest rotation lengths (Amacher et al., 2009; Amacher et al., 2011). The institutional environment is a perfect competitive market exchange with frictionless transactions in which the forest stand is managed directly by the private forest owner.

The second step of the analysis presented in this paper deals with the separation of the property rights bundle into a forest ownership and a forest management bundle of rights. The reason for this is that a main argument for the inefficiency of public enterprises relates to the discretionary power of the enterprise managers, which is assumed to be much higher in public than in private enterprises [cp. the summarized discussion in De Alessi (2004: 451)]. To isolate this separation from other institutional influences, I will analyze the effect of the described separation on the optimal rotation length. For a more refined analysis, I will extend the Faustmann model to a model in which the forest ownership and the forest management bundles of rights are separated among two individuals, the forest owner and the forest manager. The two individuals will, however, act within the institutional environment of a perfect competitive land and labor market, as in the case of the pure Faustmann model.

The analysis subsequently moves onto the problem of corporate actions. In this case the bundle of rights associated with ownership is shared among many different individuals. Therefore, in this third step, I will analyze shared ownership in the model of the private stock corporation. This will provide the analytical basis for the study of public ownership, which will take place in a fourth and final step.

I will study the institutions that form a private joint forest enterprise as a special case. One might assume that the joint enterprise is essentially an interim arrangement between the stock corporation and the public enterprise. The reader will discover, however, that this is not the case. The kinds of coordination problems solved with the help of the institutions in the case of the joint enterprise differ from those solved by the forest owners using the institutions of the public enterprise.

Applying this stepwise analysis, I expect to arrive at detailed insights into why individuals on occasion prefer public timber production and set-aside private timber production. In addition, I expect to find differences in the outcomes and that I will be able to trace these differences directly back to the impact of the prevailing institutional arrangements.

All of the models of institutional arrangements in the domain of timber production employed in this paper are highly stylized. However, I hope that I have selected the relevant components of the institutional arrangements and that I have suppressed all of those other parts exceeding the scope of my analytical interest.

2. Modeling

2.1. Separation of forest ownership and forest management

Usually the analysis of the optimal rotation length of a forest stand is based on the Faustmann model Eq. (1) and the corresponding FOC Eq. (2):

$$LEV(T) = pf(T) (e^{rT} - 1)^{-1} \rightarrow \max_T \quad (1)$$

$$pf'(T^0) = r[pf(T^0) + LEV(T^0)] \quad (2)$$

where LEV is the land expectation value; T is the rotation length; T⁰ is the optimal rotation length, p is the timber price; f is the timber volume; r is the interest rate (Amacher et al., 2009). This approach is valid for cases in which the forest stand is managed directly by the private forest owner.

Where the forest owner prefers to employ a forest manager, it is usually because he or she assumes that the forest manager possesses particular knowledge enabling that person to manage the forest in such a way that the trees grow faster.

Assumption 2.1. The growth of the trees is better under forest manager stand management than under forest owner stand management:

$$f_M(t) > f_O(t), \quad (3)$$

Where M means manager, O means owner.

Assumption 2.2. The knowledge of f_M(t) is assumed to be asymmetric, meaning that the forest manager knows f_M(t) but not the forest owner. Otherwise there would be no need for the forest owner to employ a forest manager.

If we specify f(t) in Eq. (1) we get:

$$LEV_O(T) = pf_O(T) (e^{rT} - 1)^{-1} - W^* \rightarrow \max_T, \quad (4a)$$

$$LEV_{SE}(T) = pf_M(T) (e^{rT} - 1)^{-1} - W_M \rightarrow \max_T, \quad (4b)$$

and in the equilibrium we have:

$$LEV_{SE}(T) = LEV_O(T), \quad \text{with } W^* < W_M \quad (4c)$$

The notations in Eq. (4a) mean: LEV_O(T) is the LEV for the case in which the forest stand is managed directly by the private forest owner; LEV_{SE}(T) is the LEV where forest ownership and management are separate (SE); W is the present value for a perpetual, annually constant wage stream¹ with $W = wr^{-1}$; W* is the present value of market equilibrium wage rate; W_M is the present value of the market wage rate of the forest manager.

W_M carries for both the demand and supply market information on labor and the present value of the investment in the specialist silvicultural knowledge that results in f_M(t). A higher or lower W between different labor inputs carries nothing more than a difference in the investment made to obtain specialist knowledge. Thus, W* equalizes the differences in the knowledge investments, measured in present value terms; for example, for a three wage rate case:

$$W^* = W_l - K_l = W_m - K_m = W_h - K_h \quad (5)$$

where l stands for low level; m for medium level; h for high level; and K is the present value of the investment in knowledge (cp. Stiglitz, 1985, which offers important insights into the equilibrium wage distribution by using a quit rate function as an example).

For the case of the forest manager we get

$$W_M = W^* + K_M, \quad (6a)$$

so that in the equilibrium we have

$$K_M = LEV_{SE}(T_{SE}^0) - LEV_O(T_O^0). \quad (6b)$$

It should be clear that the forest manager maximizes neither LEV_O(T) nor LEV_{SE}(T) because any kind of LEV is the capitalized income of the land owner, not the income of the forest manager. The income of the forest manager is the fixed annual wage the forest owner pays as part of the labor contract.

The fixed annual sum does not mean, however, that the forest manager has no opportunity to maximize his annual wage income by varying the rotation length. On the contrary, the higher the rotation

¹ Clearly there are different wage schedules that a forest owner can apply. From the huge body of literature produced since the very beginning of the study of forest economics [cp., e.g., di Paprica (1789): 29] we know that a rotation length dependent wage schedule is difficult to implement. Consequently, the wage paid is normally entirely independent of the rotation length and paid at a fixed annual rate.

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