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A Leviathanic Analysis

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Abstract

For ten years after the federation of Australian states in 1901, 75 percent of the customs and excise duties collected by the Commonwealth was, by constitutional guarantee, transferred to the States. The paper analyses the impact of this guarantee on tariff rates by modelling the Commonwealth as a revenue maximiser, incentivised by electoral considerations to a spend a certain amount of revenue on the public rather than itself. The model implies that 'low' tariff rates would have been made still lower by the guarantee, and 'high' rates still higher.

Section 89 of the Australian Constitution reads,

During a period of ten years after the establishment of the Commonwealth and thereafter until the Parliament otherwise provides, of the net revenue of the Commonwealth from duties of customs and of excise not more than one-fourth shall be applied annually by the Commonwealth towards its expenditure.

This guarantee to the States, for ten years after their federation in 1901, of 75 percent of the customs and excise duties collected by the Commonwealth is known as the 'Braddon Blot'. 'Braddon' because E.N. Braddon, the Premier of Tasmania from 1895-1899, was the section's sponsor. And 'Blot' because, its adversaries believed, the section would have the effect of raising tariffs. Without the Blot, they reasoned, the tariff financing of, say, £1m of Commonwealth spending would require the Commonwealth to raise £1m of tariff revenue; but with the Blot the Commonwealth would need to raise £4m of tariff revenue, as £3m must, by Section 89, go the States. On such reasoning, George Reid, the Premier of NSW was hostile to the section, and succeeded in limiting its operation to just 10 years, instead of the indefinite duration which was originally envisioned.

In assuming the Commonwealth would take its expenditure to be exogenous, be totally unconcerned about the implications of any tariff for consumers and producers, the reasoning of the Blot's critics was crude.

The paper advances a more developed analysis of the implications for tariffs of the Braddon Blot by means of modelling the Commonwealth as a revenue maximiser – a Leviathan – but incentivised by electoral considerations to a spend a certain amount of revenue on the public rather than itself. The model implies that if a tariff is below the revenue maximising rate, the Blot will operate to reduce the rate of tariff, contrary to Reid's foreboding. But if a tariff is above the

maximising rate, the Blot will operate to increase the rate of tariff, in accord with Reid's apprehension. Put loosely, 'low' rates will be made still lower by the Blot, and 'high' rates still higher.

I The Background

Prior to the creation of the Commonwealth in 1901, all tariff revenue was collected by the states, or 'colonies' as they were usually styled. From the 1850s and earlier they had instituted tariffs, originally out of a wish to raise revenue rather than from a wish to benefit import competing industry. By 1900 protectionist sentiment had burgeoned, sometimes to the point of tariffs being so high as to be detrimental revenue (Coleman 2020), but the colonies remained highly dependent on tariff revenue. Table 1 indicates that anywhere between one third and two thirds of their revenues were obtained from tariffs. Thus with the transfer of tariff collection to the Commonwealth the revenues of States would be massively reduced, without a commensurate reduction in spending responsibilities. The Commonwealth would be in abundant surplus; the States in acute deficit. Various solutions were proposed, but the one chosen was to require the Commonwealth to remit to the states at least 75 percent of the revenue it collected. This was Section 89, 'The Braddon Blot'.

Table 1: Customs Revenues, 1900

	Population, million	Government Revenue, (excluding business revenues) £million	Customs Revenue, £million	Customs Revenue, per cent of government revenue	Customs Revenue, £ per capita
NSW	1.36	4.99	1.736	34.8	1.28
Victoria	1.12	3.82	2.267	59.3	1.90
Queensland	0.49	3.12	1.603	51.3	3.25
SA	0.36	1.28	0.643	50.4	1.78
WA	0.18	1.40	0.925	66.3	5.14
Tasmania	0.17	0.76	0.491	64.9	2.84

Source: Barnard (1985)

The Table suggests that Tasmania had the most to be anxious about the transfer of tariffs to the Commonwealth. And NSW the least. Under the Reid government of 1894-1899, NSW could be described as the 'free trade state'. NSW's tariff schedule was remarkably brief, barely two pages in length[1]. And the tariff wall was narrow; 5 of every 6 pounds of customs of revenue was derived from alcohol, tobacco products, opium and tea. Reid's policy stance was not, however, strong enough to completely eliminate Section 89 from the new Commonwealth, and it was to be in force between 1901 and 1910.

[1] *Customs Duties Act* of 1895 and 1898.

Were Reid's anxieties justified? What does theory suggest was the impact of the Section?

II A Minimal Model

In seeking an insight into the impact of Section 89, consider modelling government as an exploitative Leviathan. It obtains utility by spending on itself, and none from spending on the public, and it therefore maximises total (gross) revenue, R.[2] Finally, assume that revenue on any good i is a function only of the tariff rate on i. This simplification allows the maximisation of total revenue to the be treated as N distinct maximisation problems, one for each of the N imports. The government maximises the net revenue, N_i, from a tariff on good i,

$$\max_t \qquad N_i = [1-\gamma]R_i(t_i)$$

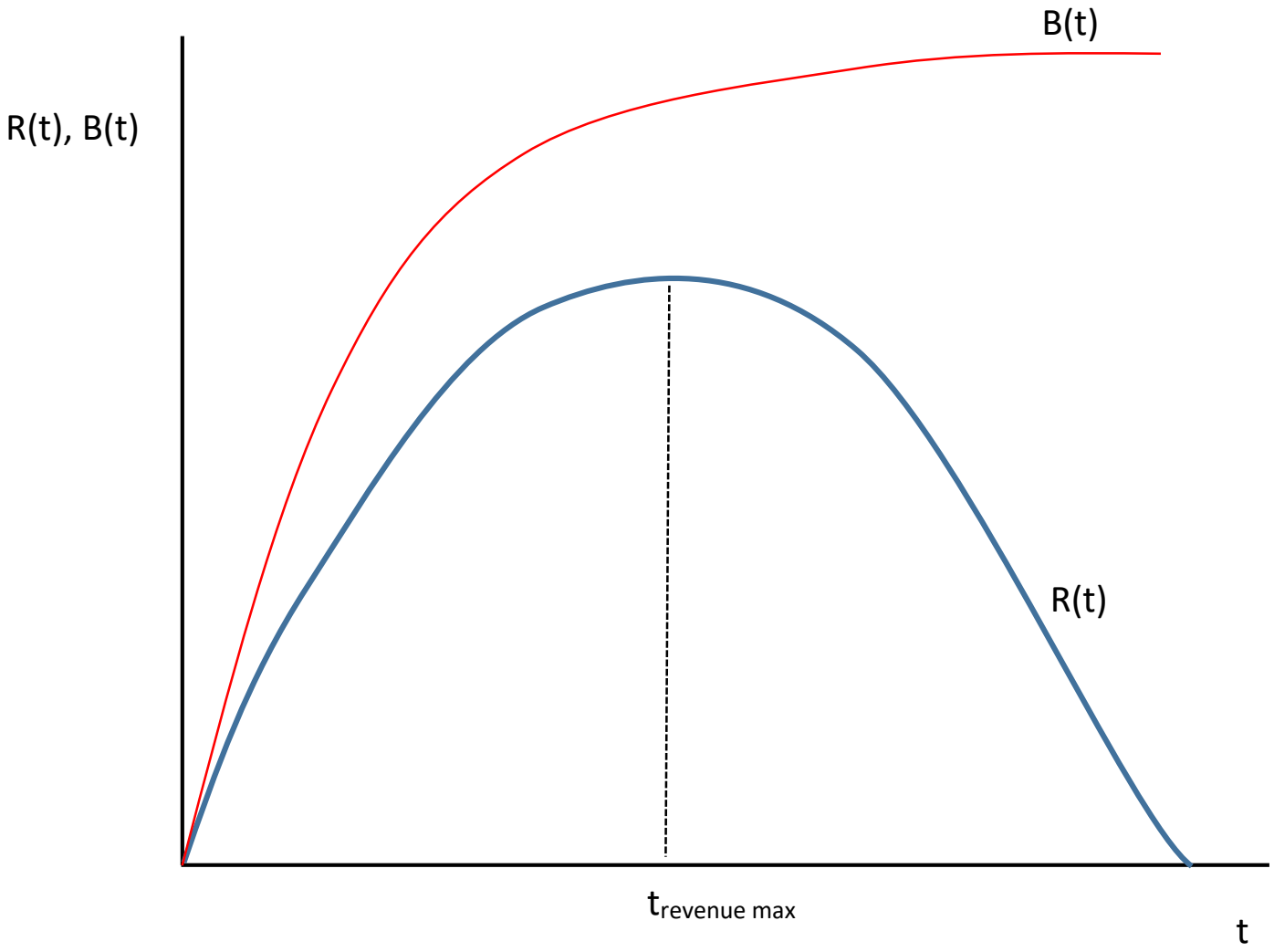
where γ is the fraction of tariff revenue that must be remitted to the States; i.e. 0.75 in the *Constitution of the Commonwealth of Australia Act*. The solution to the maximisation problem is,

$$R_i'(t_i) = 0$$

and is illustrated in Figure 1.

[2] Taxes on either consumption or production would revenue-dominate any tariff of equivalent impact on prices. Consumption taxes, or sales tax, were probably beyond the administrative capacity of the colonies. It is less clear if production taxes were infeasible. There were taxes on the production of alcohol, for example. But there were also 'sly grog shops'.

Figure 1. The the Revenue Maximizing Tariff Rate, its Revenue and its Burden



The first order condition implies the revenue maximising tariff rate is entirely independent of the magnitude of γ,

$$\frac{\partial t_i}{\partial \gamma} = 0$$

Thus, in terms of Section 89, the Braddon parameter is completely irrelevant to the tariff rate, and so production and prices, and the welfare of consumers and producers. It is irrelevant to everyone except the Commonwealth and States. They are, evidently, contending over a revenue pie of a fixed size. And the Braddon parameter decides the size of each of the parties' slice.

II Price of survival models

A Model where Power Can be Lost

The minimal model of the previous section assumes that the government is completely secure in its power, regardless of how its use of the tariff might injure the community. This seems remote from the intensely democratic governments of early 20th c Australia. Any analysis should, therefore, allow for the possibility of the government losing office on account of the reduction in potential welfare, or 'burden', B, which any tariff on good i must entail.

$$Burden = B(t_i) \qquad B > 0,\ B' > 0,\ B" < 0$$

To capture this possibility the paper supposes that that 'political support', S, is diminished by the burden. 'Political support' is most easily conceived as the number of persons (voters, seats) which favour the government over the

opposition. Notice, however, the notion of the strength of political support does not have to be a 'counting heads' sort of notion. S might instead be the total of 'resources' committed to keeping some government in power. By either conception we suppose,

$$S = \alpha - \beta B(t_i)$$

The paper additionally supposes there is some critical level of support, S*, such that if support was any smaller the opposition would assume power. Accordingly, there is some critical burden, B*, at which the government is on a knife edge. It cannot survive with any higher tariff rate.

$$B^*(t_i) = \frac{\alpha - S^*}{\beta}$$

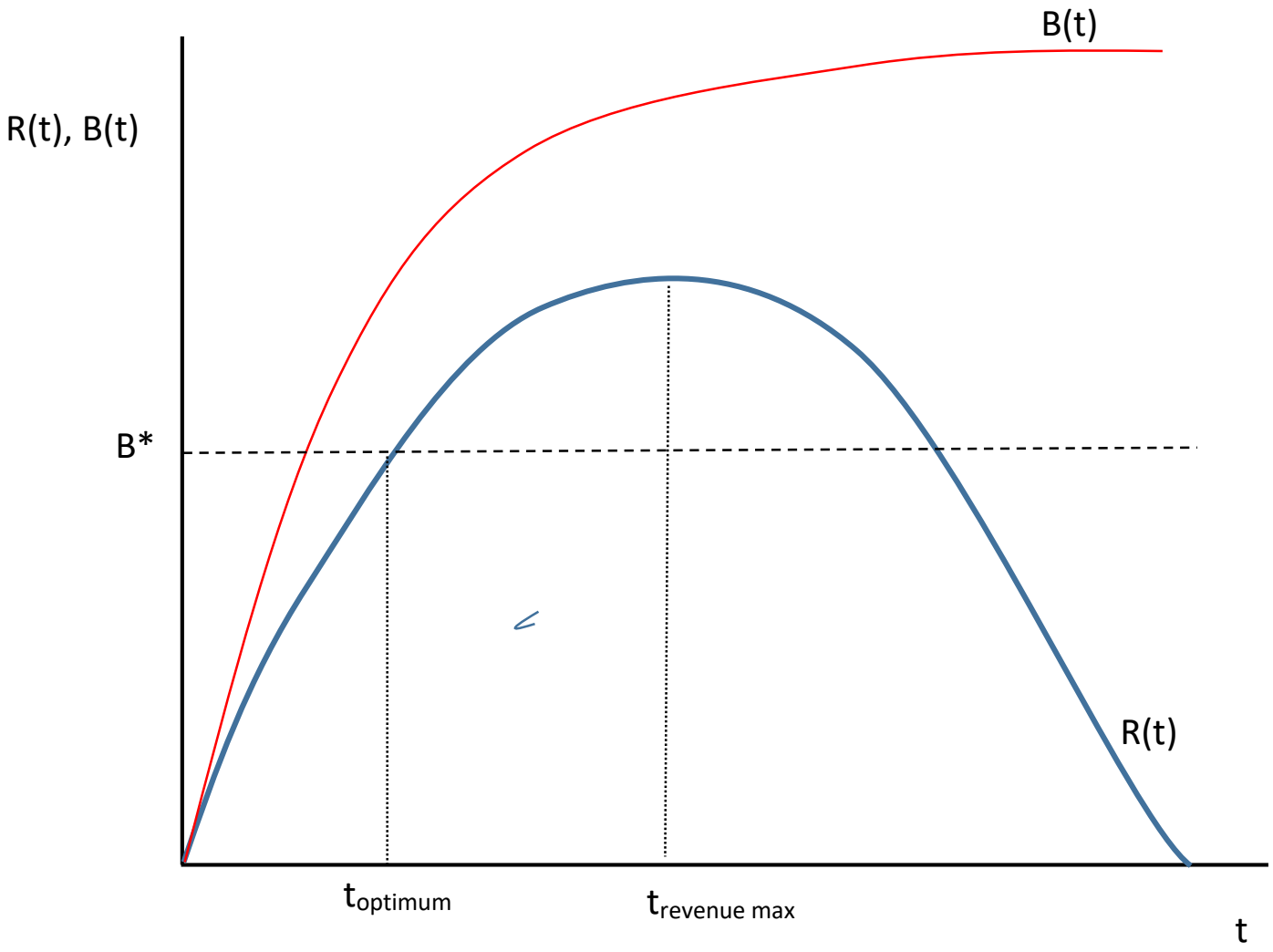
Thus the government chooses the tariff subject to the constraint,

$$\max_t \qquad N_i = [1 - \gamma]R_i(t_i)$$

$$s.t. \qquad B(t_i) \leq B^*$$

If the constraint is binding the tariff is lower than in the absence of the political support constraint.

Figure 2: The 'Optimum' Tariff Reduced by the Presence of a political support constraint



If the constraint is binding, then,

$$B(t_i) = B^*$$

This solves for the (constrained) revenue maximising tariff. Clearly the comparative static with respect to the Braddon parameter is the same as without a 'burden constraint',

$$\frac{\partial t_i}{\partial \gamma} = 0$$

A Model where Power Can be Purchased

The analysis has supposed the government is stuck with the loss in support implied by the burden of any tax rate. But is the government so helpless with respect to the loss of support arising from the burden of a tariff? Perhaps a government can maintain political support in the face of an increased tariff by means of spending on the public, by way of a transfer in cash and kind, G_i; in other words, cancel out the loss of support arising from an increased burden by 'returning' some of the revenue raised by means of appeasing outlays on offended voters. In the simplest implementation of that idea, the required spend to cancel the loss in political support arising from any burden is a fraction of the 'support deficit'; i.e. the excess of the critical level of support over the actual level of support in the absence of any remedying transfers.

$$G_i = g[S^* - S] = g\beta[B(t_i) - B^*]$$

Since the burden of any tariff exceeds the revenue of any tariff,

$$B(t_i) - B^* > R(t_i) - R^* \qquad [3]$$

one may infer that if gβ exceeds 1 then the compensation required to eliminate any support deficit exceeds the revenue concomitant with that support deficit, and in consequence the capability to cancel any support deficit is valueless to the government. There are, however, at least two grounds for thinking g β to be less than one; that is to say, for thinking the cost of cancelling the loss of support implied by $1m of burden to be less than $1m. Firstly, not every person impacted by a tax is on 'the margin' politically; obviously not every person supporting the government prefers only very slightly the government to the opposition. Such persons can be harmed by a tariff without switching to the opposition. And yet since the prize of government victory is worth less to such persons, they might strive less for government victory. A second, and perhaps surer, ground for suspecting gβ is less than one lies in the gap between 'preference' and 'support'. To 'support' is to act; and a decision to act is decided by a comparison of the benefits of acting to not acting, a comparison which may go either way. A person injured by a tariff may shift from 'slightly prefer' to 'slightly oppose' a government, and yet not switch their political 'support', in that they did not support the government before (the benefit of support did not exceed its cost) and they do not support the opposition now (the benefit of opposition does not exceed its cost). To illustrate concretely; they didn't vote before and they don't vote now.[4] Thus of the persons injured to a total of, say,

[3] R* = the revenue obtained from the tariff rate that yields the critical burden, B*.

[4] Alternatively, they did not donate before, and they do not donate now.

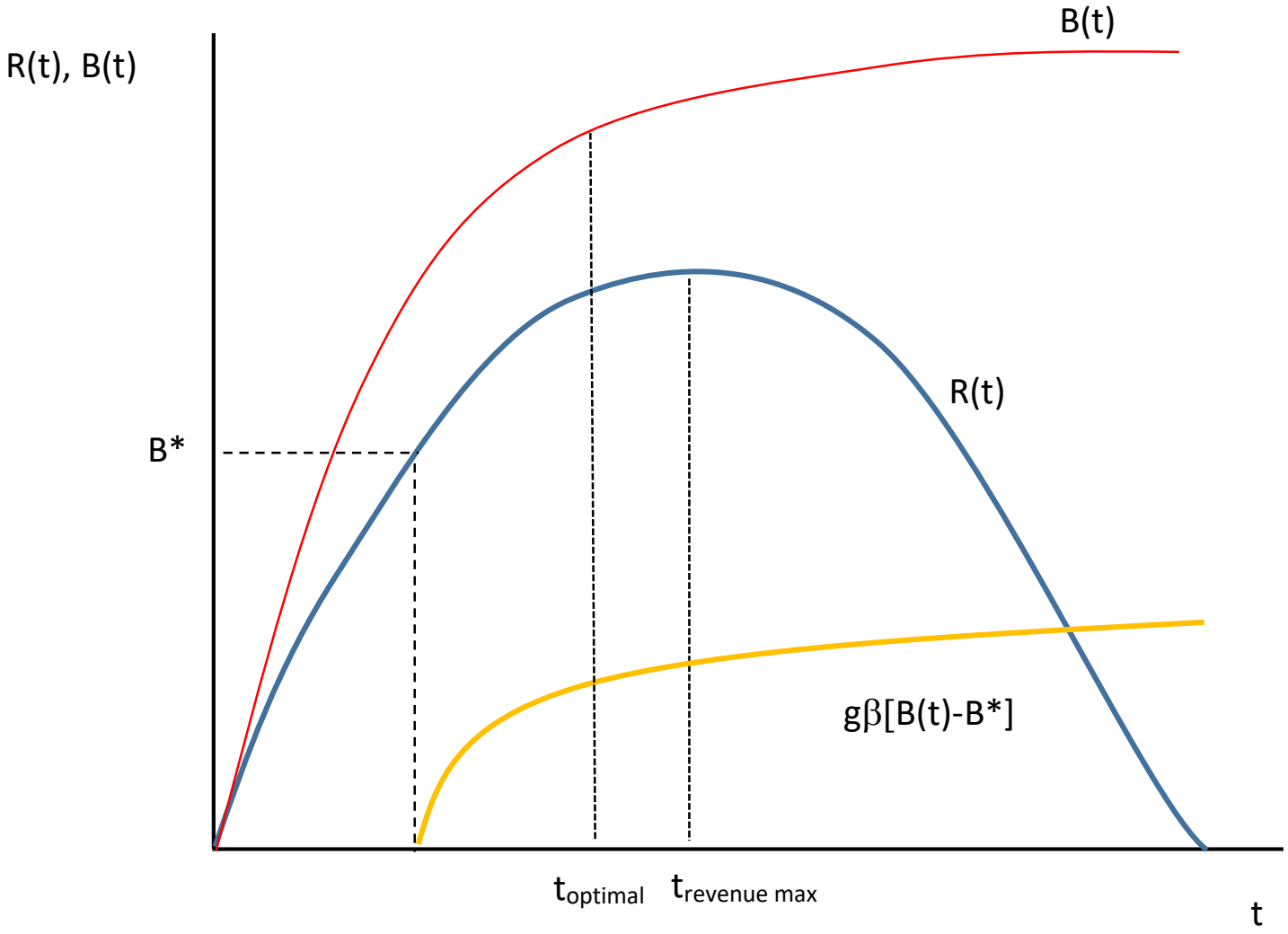
£1m, the majority are politically passive, and only a few 'on the margin of action' requiring compensation to prevent any reduction in political support. [5]

Supposing gβ is less than 1, the government faces a constraint faces a maximisation problem,

$$\max_{t} \qquad N_i = [1-\gamma]R_i(t_i) - g\beta[B(t_i) - B^*]$$

[5] Going in the other direction, it is true there are also considerations tending to make gβ in excess of one. It is rarely the case that government has the opportunity to correct burden of $100 to person j by way of lump sum cash transfer to person j. A government may seek to placate injured consumers is by way of transfers in kind ('services'). But the welfare inferiority of a 'dollar' of in kind transfers to cash transfers is well-known, and will tend to make gβ larger.

Figure 3: The Optium Tariff as Below the Revenue Maximising Rate



Or, to supress the i subscript henceforth as understood,

$$\max_{t} \qquad N = [1-\gamma]R(t) - g\beta[B(t) - B^{*}]$$

The conditions of maximisation are

First order:

$$[1-\gamma]R'(t) - g\beta\ B'(t) = 0$$

Second order:

$$[1-\gamma]R" - g\ \beta\ B^{"} < 0$$

The first order condition implies

$$R'(t) = \frac{g\ \beta B'(t)}{1-\gamma} > 0$$

Since R'(t) > 0, one may infer revenue is not maximized. The logic is obvious. A portion of every increase in revenue from an increased tariff rate must be spent on the public, as explained above. Thus a tariff increase which raises no revenue at all – the revenue maximising tax – must actually reduce the net income of the government, as it still increases the burden, even though (as a matter of revenue maximisation) it does not increase revenue. It is evidently advisable to reduce the tariff rate beneath that which maximises revenue.

The first order condition implies the sought for comparative static

$$\frac{\partial t}{\partial \gamma} = \frac{g\beta\ \ B'(t)}{[1-\gamma]R" - g\beta\ B^{"}} < 0$$

By the second order condition this comparative-static is unambiguously negative; thus, an increase Braddon parameter *reduces* the chosen tax rate. Again, the result is easily perceived. Consider the tariff rate which was Leviathan

optimal before an increase in the Braddon parameter. Increasing the rate gains (say) £1000, but would require an extra £1000 in spending; so, it is best left unchanged. But once the Braddon parameter is increased, the same increase would gain now *less* than £1000 but still require an extra £1000 in compensatory spending. With the parameter increased, there would be a net benefit from decreasing the rate from what it had been. The logic of the comparative-static may also be expressed in terms of the elementary theory of the firm. Producing a good yields a revenue and a cost, and some level of output which maximises the excess (profit). And a tax on revenue will reduce the profit maximising level of output. 'Output', in terms of the paper's model, is the tariff rate, 'cost' is the compensation outlay requisite of any tariff rate, 'revenue' is tariff revenue; and the 'tax' rate on revenue is the Braddon parameter. Thus an increase in the Braddon parameter reduces the tariff rate.

A diagrammatic analysis of the impact of the Blot

The comparative-static can also be usefully illustrated by way of a simple diagram. The method is especially convenient under the simplifying case of B* = 0.

Figure 4 represents R' and B' as functions of t, allowing for R'= B' at t = 0, reflecting the absence of deadweight loss on the 'first dollar' of revenue.

Figure 4: Marginal Tariff Revenue and Marginal Tariff Burden

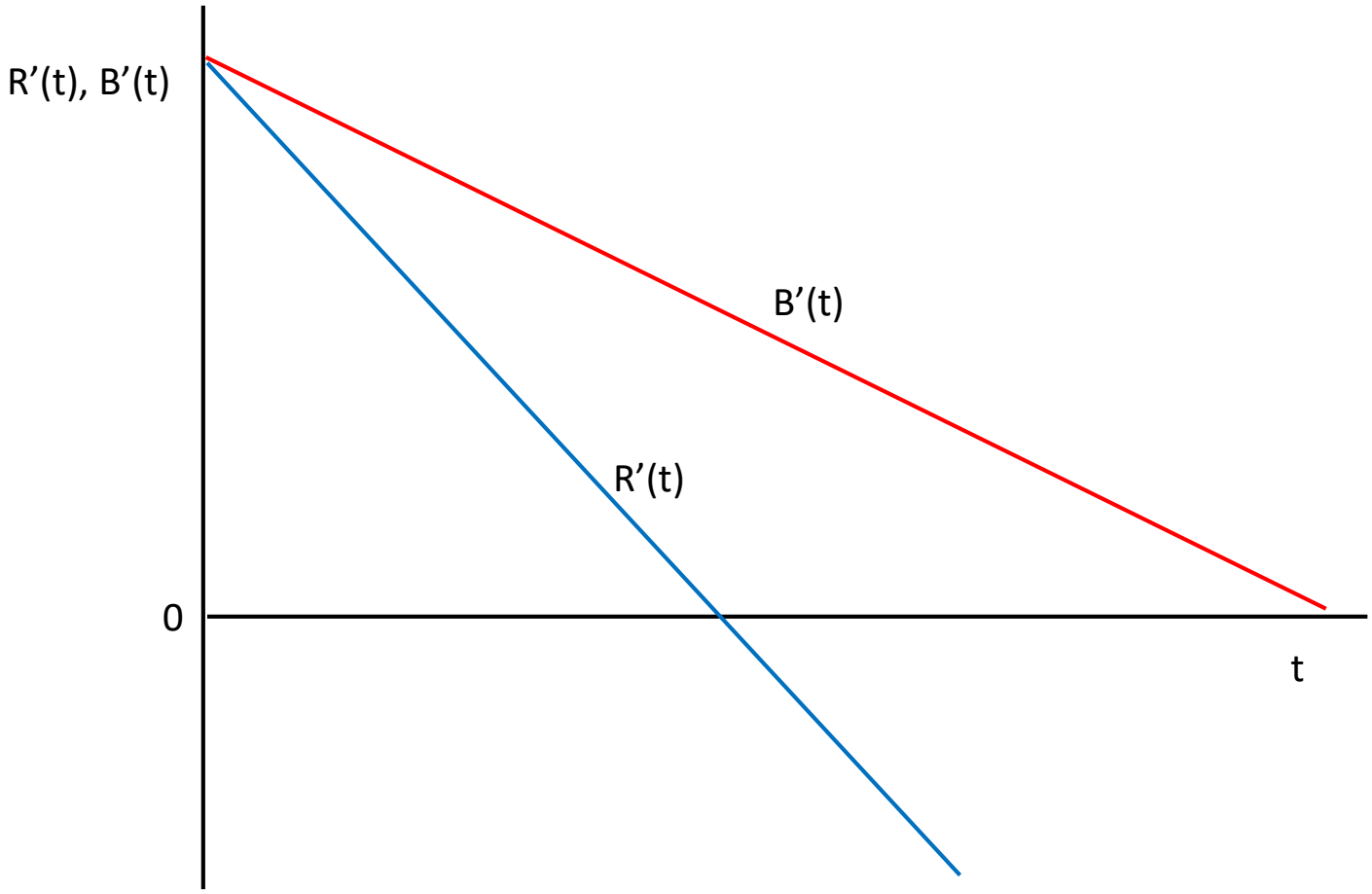
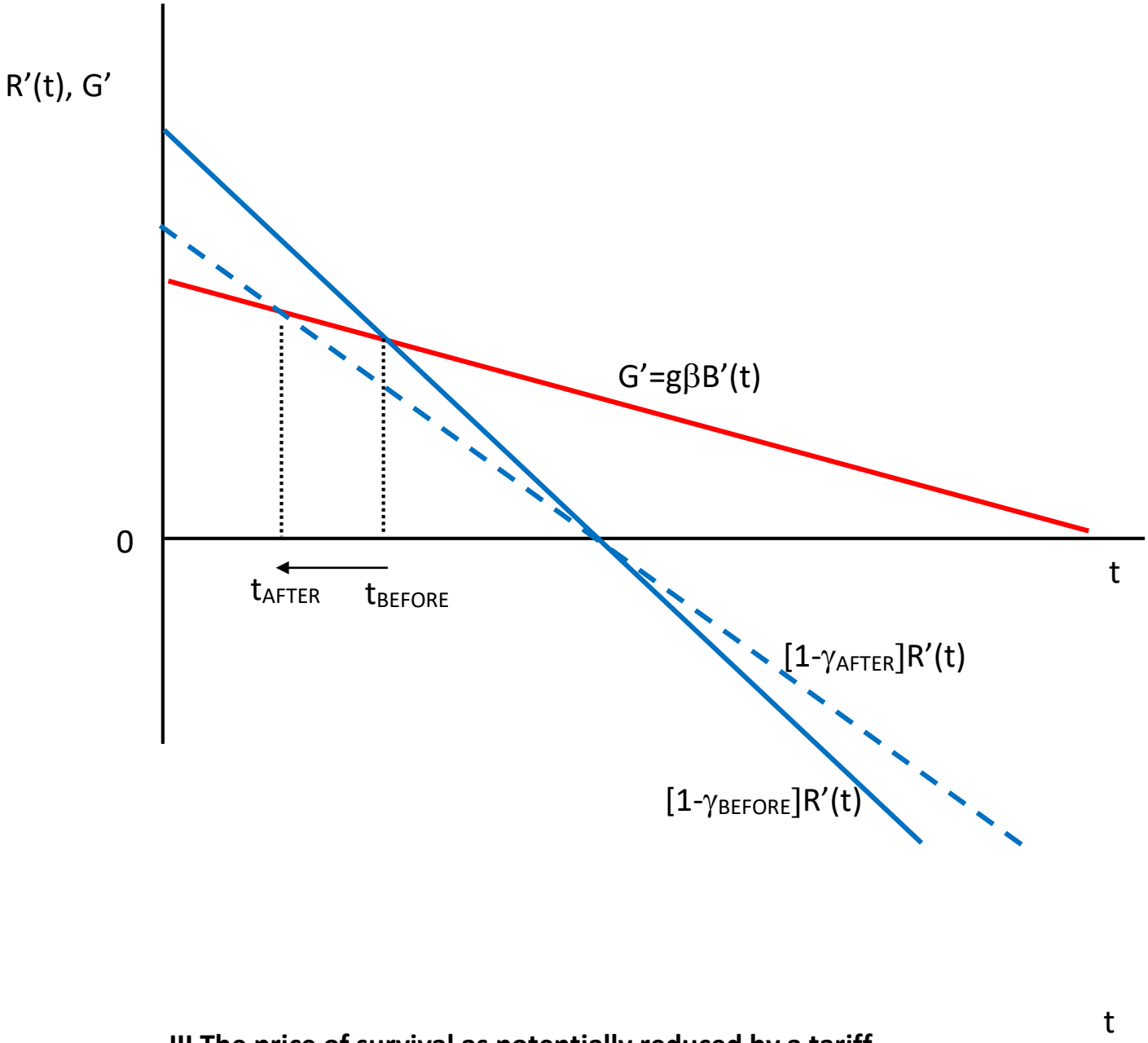


Figure 5 brings out that an increase in the Braddon parameter (from g_{BEFORE} to g_{AFTER}) *reduces* the optimal tariff rate.

Figure 5: An Increase in the Braddon Parameter Reduces the Tariff Rate



III The price of survival as potentially reduced by a tariff

Thus far the paper has supposed the damage to political support from any tax is a function of its welfare burden, B. But the burden is an aggregate of two components; the impact on consumers' surplus, and the impact on producers' surplus. There are good reasons for expecting the harvest in political support

from an extra pound in consumers' surplus to be different (probably less) than harvest in political support from an extra pound in producers' surplus. Thus the damage to political support from a tariff is not a function of aggregate burden; rather the impact on consumers' surplus and the impact on producers' surplus affect S independently and distinctly. And yet with most taxes – a tax on production (an excise tax) or consumption (a sales tax) - a tax's on both surpluses is negative, and so with respect to production and consumption taxes the conclusions of the analysis above apply, at least in qualitative terms, even in the face in a differential in the 'harvest rate'. But a tariff is different from 'ordinary' taxes; while it impacts negatively on consumers' surplus, it impacts positively on producers' surplus. Thus if we let C(t) be the (positivized) reduction in consumers' surplus caused by the tariff, and P(t) be the increase in producers' surplus, support S might be best modelled,

$$S = \alpha - \kappa C(t) + \pi P(t) \qquad \kappa < \pi$$

Thus

$$S' = -\kappa C' + \pi P' \qquad C' > P' \qquad [6]$$

If the rate of harvest of political support from consumers surplus, κ, was the same as the rate of harvest of political support from producers surplus, κ, then S' must be negative, as C' > P'. But if $\pi > \kappa$, then S' may be either negative *or positive;* and so it is possible support may be increased by a tariff. On account of the ambiguity of the sign in S', the sign of G'

[6] $C' \equiv -\frac{\partial CS}{\partial P} = q_d \qquad P' \equiv \frac{\partial PS}{\partial P} = q_s$

$$G' = g[\kappa C' - \pi P']$$

may either be positive *or negative*; the cost of appeasing payments, requisite to maintain the critical level of political support, need not be increased by an increase in the tariff, and may be *decreased* by it. G", however, is unambiguously negative;

$$G" = g[\kappa C" - \pi P"] < 0 \qquad C"<0, \mathrm{P}" > 0 \qquad [7]$$

This leaves three possibilities,

(i) G' is positive at t = 0, and remains positive for all magnitudes of t less than the revenue maximising rate,

(ii) G' is positive at t = 0, but becomes negative before t reaches the revenue maximising rate,

(iii) G' is negative at t = 0, and only becomes still more negative as t rises.

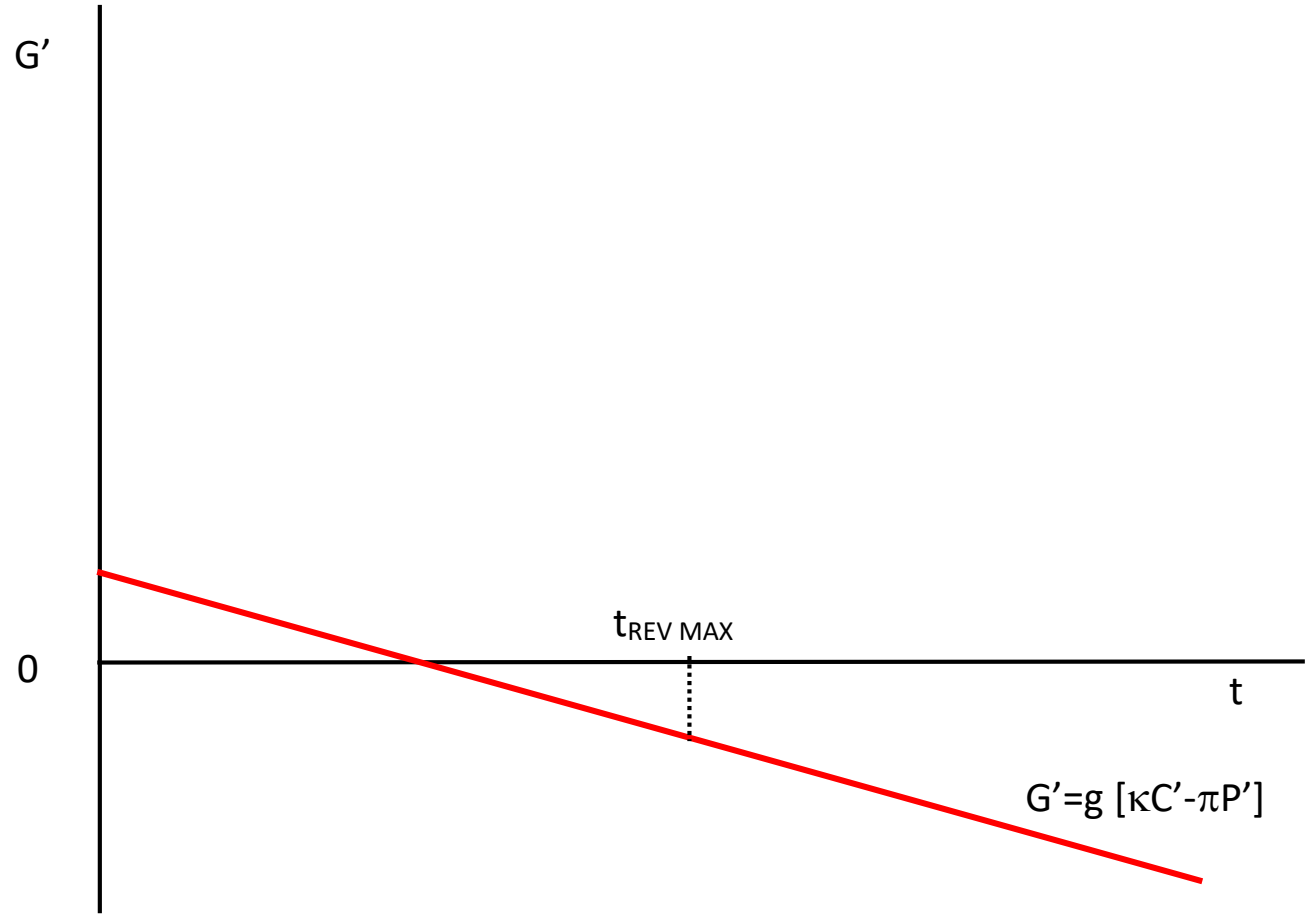
If case (iii) holds, then the government is never on the knife edge, even if it starts at it; it only increases its support surplus by increasing t above zero. In consequence, it will choose the revenue maximising rate, and the Braddon parameter has no impact.

If case (i) holds, the analysis is the same as in the second section; an increase in the Braddon parameter will reduce the tariff rate.

Case (ii) is indicated in Figure 6.

[7] $C" \equiv -\frac{\partial^2 CS}{\partial P^2} = \frac{\partial q_d}{\partial P} < 0 \qquad P" \equiv \frac{\partial^2 PS}{\partial P^2} = \frac{\partial q_s}{\partial P} > 0$

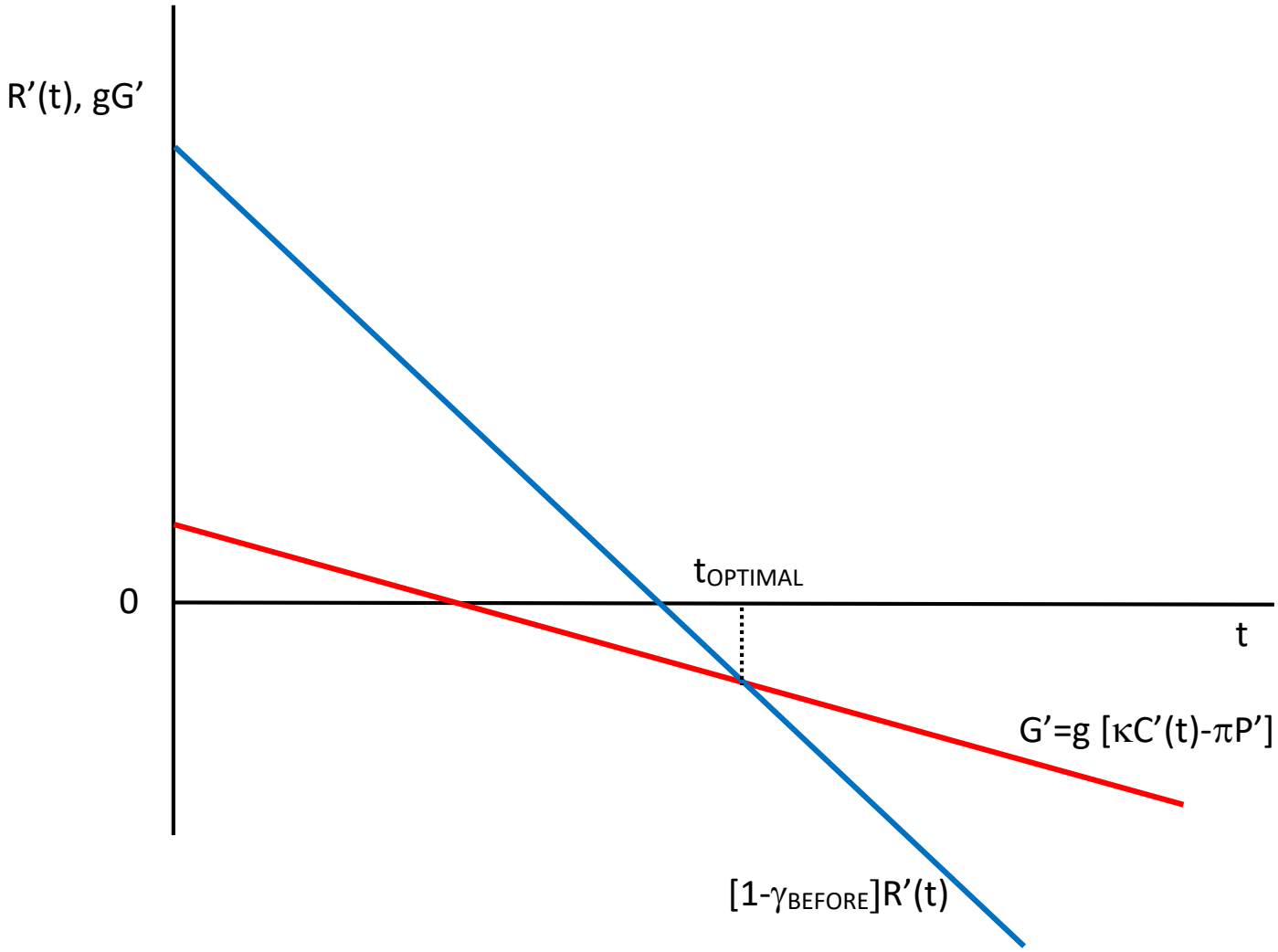
Figure 6: The Compensation Required to Maintain Political Support in the Face of a Tariff Increase Becomes Negative as the Tariff Rises



At t = 0, an increase in t reduces political support before compensation; the fact that P' is positive only makes the loss in support smaller. So if kC' was 30 and pP' was 20, the loss is 10, rather than 30. It is as if the government lost 30 seats on account of offending consumers, but won 20 on account of gratifying producers, leaving a net loss of 10. And so 10 seats must be won back through 'compensation' to keep the government in power; there is still a compensation cost. But when G' is negative an increase in t means an increase in net support in political terms. Not only is there no quota of seats to be won back by compensation; *there is now a quota of seats that may be (harmlessly) 'sacrificed' by way of reducing compensation.* So it is as if the government lost 20 seats on

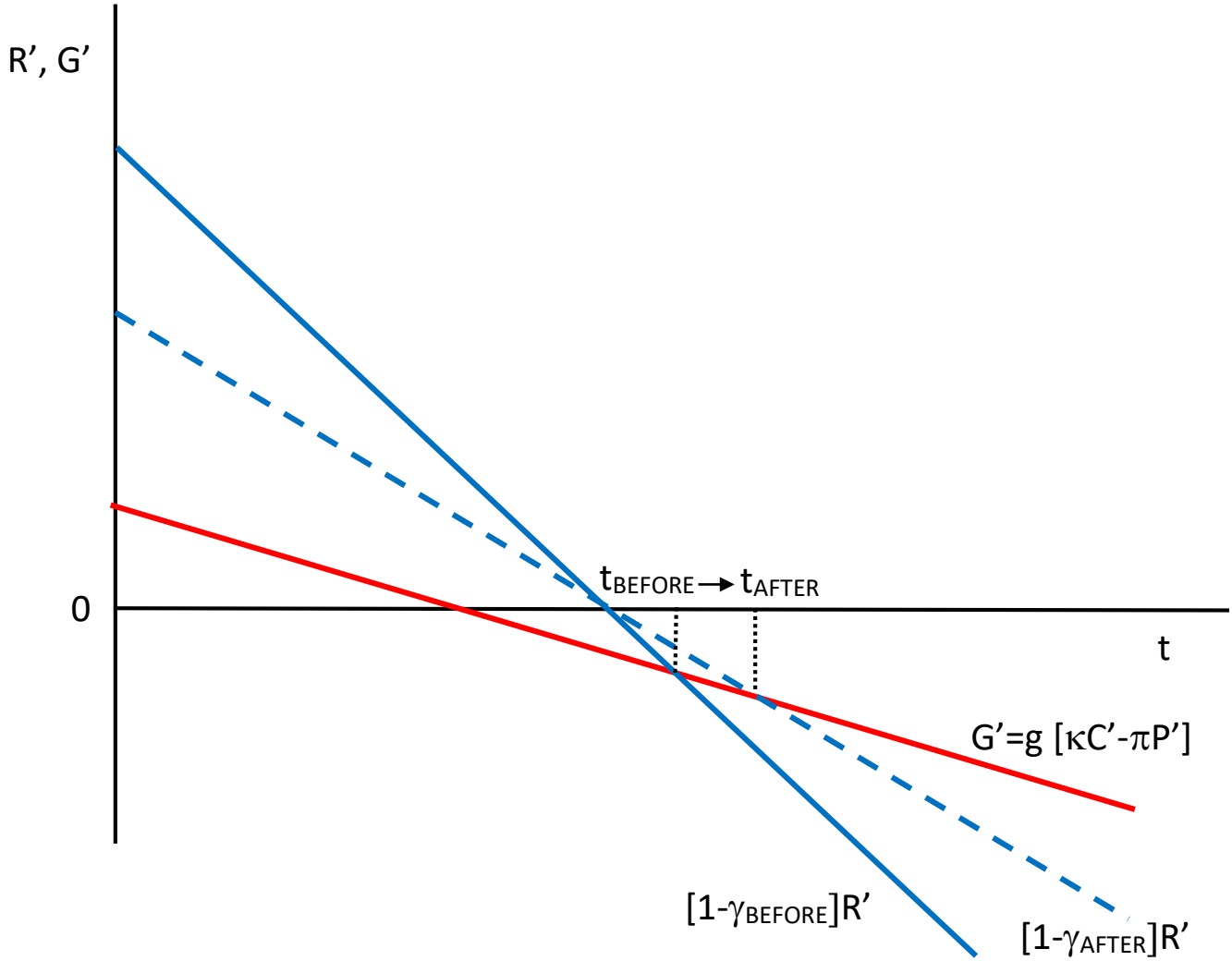
account of offending consumers, but has won 30 on account of gratifying producers. There are now 10 seats that may be sacrificed by means of reducing compensation. The upshot is that if G' is negative then there is 'money to be made' by increasing t, independently of the impact on tariff revenue; made by reducing compensation. Obviously, once t is above its revenue maximising level, there is also money lost by raising t, through the impact on tariff revenue. So, equating at the margin the pound gains and losses of an increase in t, there is will be some net revenue maximizing tariff rate, and it will be *above* the tariff revenue maximising rate. Figure 7 illustrates.

Figure 7: A Tariff Above the Revenue Maximising Rate



In this situation an increase in the Braddon parameter,γ, will *increase* the tariff rate, as Reid feared.

Figure 8: An Increase in the Braddon Parameter Increases the Tariff Rate



The logic is clear. The tariff is chosen so that the loss in revenue, at the margin, equals the reduction in compensation spending, at the margin. But a larger Braddon parameter reduces the loss in revenue at the margin; so there is now an incentive to push the tariff higher.[8]

[8] A cautionary remark. The tariff rate is increased above the revenue maximizing rate on account of the increase in producers' political support permitting the government to scale back the compensation which, at lower tariff rates, was required to keep support above the critical level. This logic does assume there is

Increase or Decrease?

The analysis concludes an increase in the Braddon parameter will *reduce* the tariff rates if G' is positive for all magnitudes of t less than the revenue maximising rate; but will *increase* the tariff rates if G' is positive at t = 0, but becomes negative at some rate of t less than the revenue maximising rate. Resolving the ambiguity turns in part on how positive is G' at t = 0

$$G'(0) = g[\kappa C'(0) - \pi P'(0)] = g[\kappa q_d(0) - \pi q_s(0)]$$

Evidently, the larger the quantity demanded at t = 0, the more likely G' is to be positive, and so the more likely an increase in the Braddon parameter will *reduce* the tariff rate. Conversely, the smaller the quantity supplied at t = 0, the more likely G' is to be positive, and so the more likely an increase in the Braddon parameter will *reduce* the tariff rate. Thus if imports satisfy a large part of the market, then more likely an increase in the Braddon parameter will *reduce* the tariff rate. Conversely, if imports satisfy a small part of the market, then the more likely an increase in the Braddon parameter will *increase* the tariff rate. Thus for a tariff on tea (small local supply), the Blot will tend to operate to reduce the rate of tariff. But for a tariff on boots (large local supply), the Blot will tend operate to increase the rate of tariff, in accord with Reid's apprehension. [9]

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some compensation to be scaled back. But it may be that before the 'optimum tariff' is reached compensation has been scaled to zero. The optimum of the preceding analysis is not a true optimum.

[9] The ambiguity also partly turns on how negative is G".

$$G" = g[\kappa C" - \pi P"] = g[\kappa \frac{\partial q_d}{\partial P} - \pi \frac{\partial q_s}{\partial P}]$$

More formally, if

$$\frac{q_S(t_{RMAX})}{q_D(t_{RMAX})} > \frac{\kappa}{\pi}$$

then an increase in the Braddon parameter increases the tariff rate. But it is difficult to judge the realism of such a condition.

Seeking to identify the impact of the Blot, we might try to rely on the model's implication that if the chosen tariff is below the revenue maximising rate, then an increase in the Braddon parameter reduces the tariff; and if the chosen tariff is above the revenue maximising rate then an increase in the Braddon parameter increase the tariff. Thus, seeking to identify the impact of the Blot, we ask, 'Are tariffs above or below their revenue maximising rates?'. But that, too, is difficult to judge. The one easily made observation is many goods were tariffed at zero by the Customs and Excise Act of 1902. And zero rates are difficult to reconcile with the model, regardless of what might be assumed about κ and π; for some positive rate always seems optimal. But the model so far has ignored the administrative or collection costs of a tariff.

IV The Breadth of the Tariff

The more negative G", the more likely G' will become negative, and so an increase in the Braddon parameter will increase the tariff rate.

The analysis has so far assumed that collection of revenue is costless. But it is plausible that there will be a fixed cost, F, for any tariff i. Clearly, revenue maximisation of the Commonwealth implies it not imposing a tariff if the maximum revenue, net of compensation costs, is less than F. As an increase in γ reduces revenue, we would expect that as γ increases the net revenue yield of some tariffs will fall below F, and they will cease to be tariffed. Thus the larger γ, the narrower the tariff base.

V Welfare Implications

Does the model have any implications of the welfare cost, or benefit, of an increase in the Braddon parameter?

Welfare implications are somewhat concealed by unanswered questions about G. Are these 'transfers' in the form of private goods or public goods? And if they are private goods, are they in the form of outright lump sum transfers of alterations in subsidies and taxation? Lump sum transfers are, presumably, rare. And alterations in subsidies and/or taxation have their own welfare costs and benefits to analyse. As for public goods, we would expect the Leviathan to undersupply public goods, and so a £1 extra spent on public goods to have more than £1 of benefit. Except that the £1 extra spent on public goods will, in this model, be spent 'political effectively' rather than 'cost effectively', so we can't assume £1 extra spent will have more than £1 of benefit.

But one definite conclusion can be made without further assumptions. The welfare of the community (as distinct from the Leviathan) will be diminished by the operation of an increase in the Braddon parameter on those goods tariffed at above the revenue maximising rate. This is because the analysis predicts that

in response to an increase in the Braddon parameter the tariff on any such good will rise, and G, the appeasing transfers associated with the tariff, will fall. Both these impacts operate in the same direction; to reduce the welfare of the community.

VI Concluding Comment

The paper's analysis amounts to both a partial vindication and a partial repudiation of the apprehension of Blot critics that Section 89 would increase tariff rates. The analysis concludes that the Blot may either increase or reduce tariffs, with low rates tended to be made still lower, and high rate still higher.

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