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The Struggle over Australian Railways in 1890s:

The Strange Economics of State Control vs the Ruthless Economics of Federal.

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By 1900 the six governments of Australia were in possession of the largest government planned and financed railway network anywhere in the world.[1] These railways were easily the most significant capital works within the country; the amount of invested in this network in NSW and Victoria was multiples of the capital in manufacturing[2]. They constituted the largest employers in Australia, and they reported net profits.[3] Given the stakes, it is not completely surprising that there was much contention over them when it came to creating a new level of government in the end of 1890s; the Commonwealth of Australia. Which government would control these spacious assets? The States? Or the Commonwealth? Or, perhaps, the States under the supervision of a Commonwealth instrumentality? These questions roiled the Australiasian Federal Convention of 1897-8, and left a definite impress on the Constitution that resulted.

This paper analyses the economics of the confrontation railway networks of the two largest states, NSW and Victoria, and evaluates the impacts on economic welfare of two alternatives; State control and Commonwealth control.

The paper uses a Leviathanical modelling of government to argue that Commonwealth control would remove certain social losses arising from State management of the railways, but that the beneficiary of their removal would be exclusively the Commonwealth. The community at large would be harmed by

[1] 17,000 km in 1900. See Pincus (2016).

[2] In 1900 the 'capital cost (including equipment)' of railways in NSW was recorded at £38.5m, while the 'value of machinery, implements and tools' in manufacturing in NSW was put at £5.7m. (*NSW Statistical Register for 1900 and Previous Years*, p.960, p.639.)

[3] in 1913 there were 31,000 railway employees in NSW (Patmore 1988) *vs* a labour force of 688,300 in the 1911 census (Withers *et al* 1985). Thus between four and five percent of the NSW workforce were employed on the railways.

Commonwealth control. Better to have control dispersed to competing, if resource wasteful, governments of NSW and Victoria, than monopolised by hard charging the Commonwealth.

I The Background.

Australia's railway network of the 1890s – linking Adelaide to Melbourne to Sydney to Brisbane – was entirely in the hands of the respective distinct governments of South Australia, Victoria, New South Wales and Queensland. There was, in consequence, competition by governments for traffic at their borders. The flashpoint was the Riverina region, within NSW but adjacent to Victoria, and much closer to Melbourne than Sydney. To obtain this rail traffic Victoria offered 'preferential rates' to traffic originating in NSW. To keep traffic, NSW 'gave large concessions for hauls to and from the Riverina' (La Nauze 1972, p.155). These concessions were claimed to be so large as to leave charges below cost, although fixed, variable and joint costs seem not to have been distinguished in such claims. It appears NSW did not attempt to win traffic originating from within Victoria.

The four governments equilibrium of preferential and concessional rate was menaced in the 1890s by the approach of federation. Victoria and NSW would each now be subject to a federal constitution, which would be committed to a homogenous economic space within Australia. In consequence, Victoria was concerned that federation might forbid preferential rates as a 'negative tariff'. NSW was concerned that federation, by way of compensation to Victoria, might forbid concessional rates. Others favoured, and others fought, the prospect of direct federal regulation of traffic rates. Some supported, and some opposed, outright federal control of railways.

This paper deploys a cut-down theoretical schematisation to get a handle on the welfare impacts of the alternative structures of railway governance considered in the 1890s.

II A Modelling

A modelling begins with assumptions about the nature of government. Some alternative plausible modellings include,

1. An exploitative government. This is where a government maximizes the profit of the railways it controls, and retains all profits for itself. If such a government is also without competitor governments, it will be dubbed a 'Leviathan'.
2. A captured government. Here the government not an autonomous power, but has is controlled by some economic interest, and managed for that interest's maximal benefit. To illustrate, it was widely claimed at the time that railways were managed for the benefit of the merchants of the capital.[4] By the opening of the 20th c, railway employees were more plausibly a directing interest, with their growing unionisation and political heft (Patmore 1988). Customers, were also potentially at least, a directing interest.
3. A contested government. This is where rival economic interests struggle to capture the railways, with the upshot that compromises are made which leaves each interest judging the benefit of acquiring unqualified control not worth the cost.

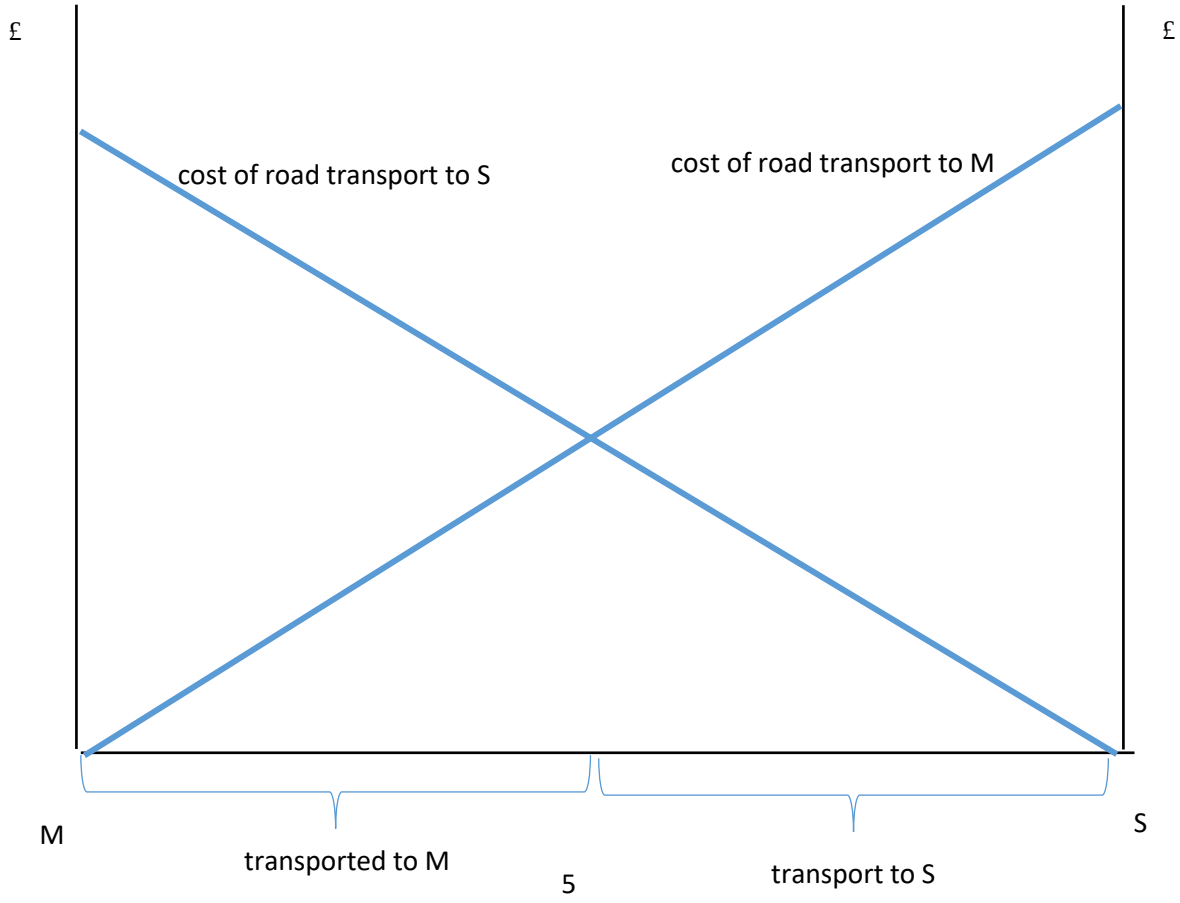
[4] 'The [concessional] rates were instituted to prevent Victorian merchants from undercutting merchants from thus colony': Henry Copeland, *New South Wales Parliamentary Debates,* 14.8.90

Doubtless, assuming a contested state is the most realistic modelling, but it is also the most complex. This paper proceeds by way of the simplest modelling; the exploitative.

III A Minimal Model: Rail Transport at Zero Cost

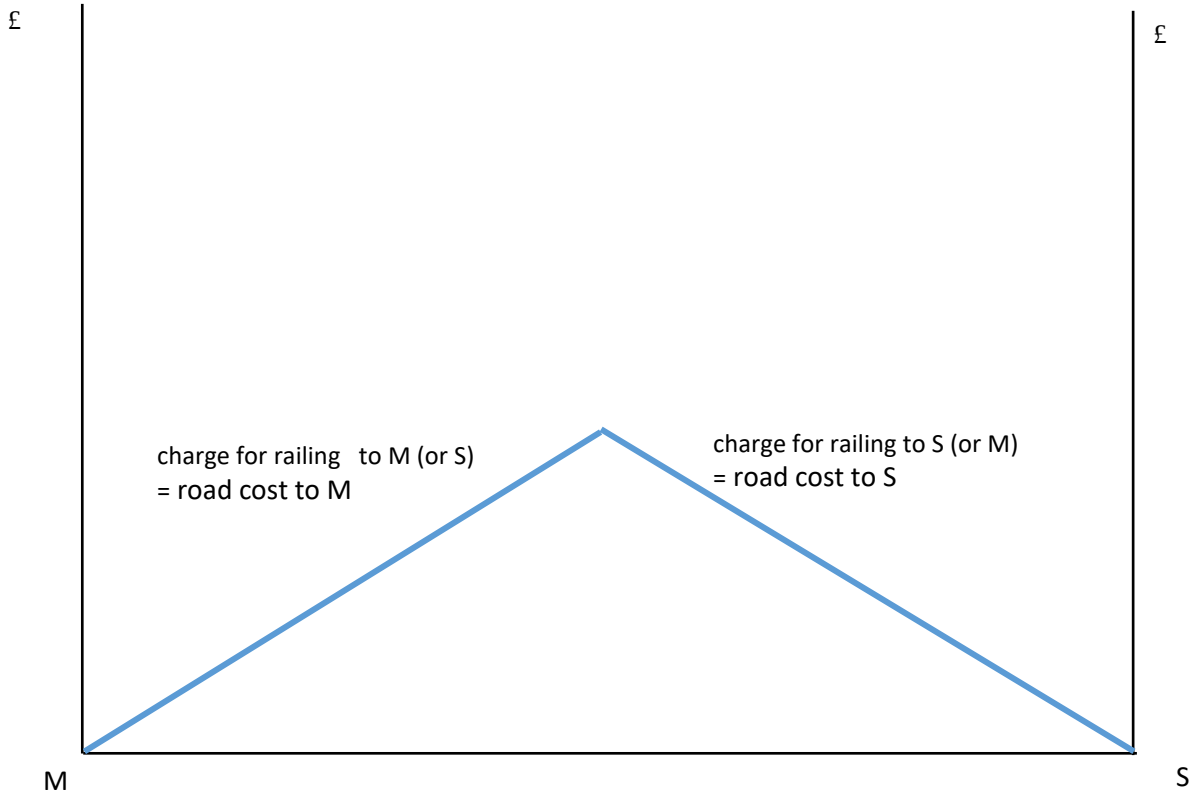
Consider two port cities S and M, situated at opposite extremities of a plain populated by pastoralists who produce solely for export to overseas markets. S and M are connected by road. There is no charge for using the road, but the cost of fuel and labour in road transport costs a flat $R per mile. If pastoralists were restricted to road they would obviously attend to a comparison of the total cost of roading the produce to S with the cost of roading it to M, and choose to export through S or M accordingly. (We assume throughout that the value of the product exceeds the cost of transport to port.)

Figure 1: Road transport costs on the assumption of symmetry and linearity



Suppose now a railway is built connecting S and M. And suppose, for the time being, that the cost of railway transport is zero. Suppose, finally, that the entire railway is under the control of a single government, which may charge users as it wishes, while the road remains available to users free of government charge. The road, then, is rail's competitor. In consequence the demand price for rail transport is the cost of road transport to the nearest port. It is clear that a monopoly government – a Leviathan - will price discriminate, and charge for rail freight an epsilon less than the cost of road transport to the nearest port.

Figure 2: The Leviathan's Railway Tariff



Since railway transport is assumed to be costless, the government is indifferent regarding which port it sends any given consignment of freight.

In this 'Leviathan equilibrium' there is no social inefficiency; the pastoralists' activity is precisely the same as if they were charged only the marginal cost of rail transport (namely, zero). But the entire social benefit of the railway is, evidently, annexed by the Leviathan. To put this point another way; for pastoralists (and, by extension, the interior communities supported by pastoralism) the existence or non-existence railway is a matter of indifference; it may as well not have been built.

IV Two governments

Suppose now that one portion of the railway is controlled by one government, 'Mland', and the remaining, larger, portion is controlled by another government, Sland'. Each government has complete control over the railway line within its territory, and none beyond the border. Each can charge whatever it likes to whoever uses the railway within its territory. But, critically, since each has no information concerning the point of origin of traffic entering from over the border ('cross-border traffic'), it cannot price discriminate according to the point of origin of such traffic. So each government can only set a uniform charge for all cross-border traffic. The fact that each government can discriminate over traffic originating *within* its borders, and not to traffic originating *outside* its borders, drives the results of the model.

The Sland pastoralist has two potential destinations: S or the border. And so there are two demand prices.

The demand price for rail transport to S. This is *either* the cost of road transport to S, *or* the cost of road transport to the border *plus* the charge of Mland for

cross border transport to M, whichever is the smaller. At some distance from S these two magnitudes will be equal. Nearer to S the first is smaller and, therefore, amounts to the demand price for rail to S. Nearer the border second is smaller, and amounts to a demand price for rail to S.

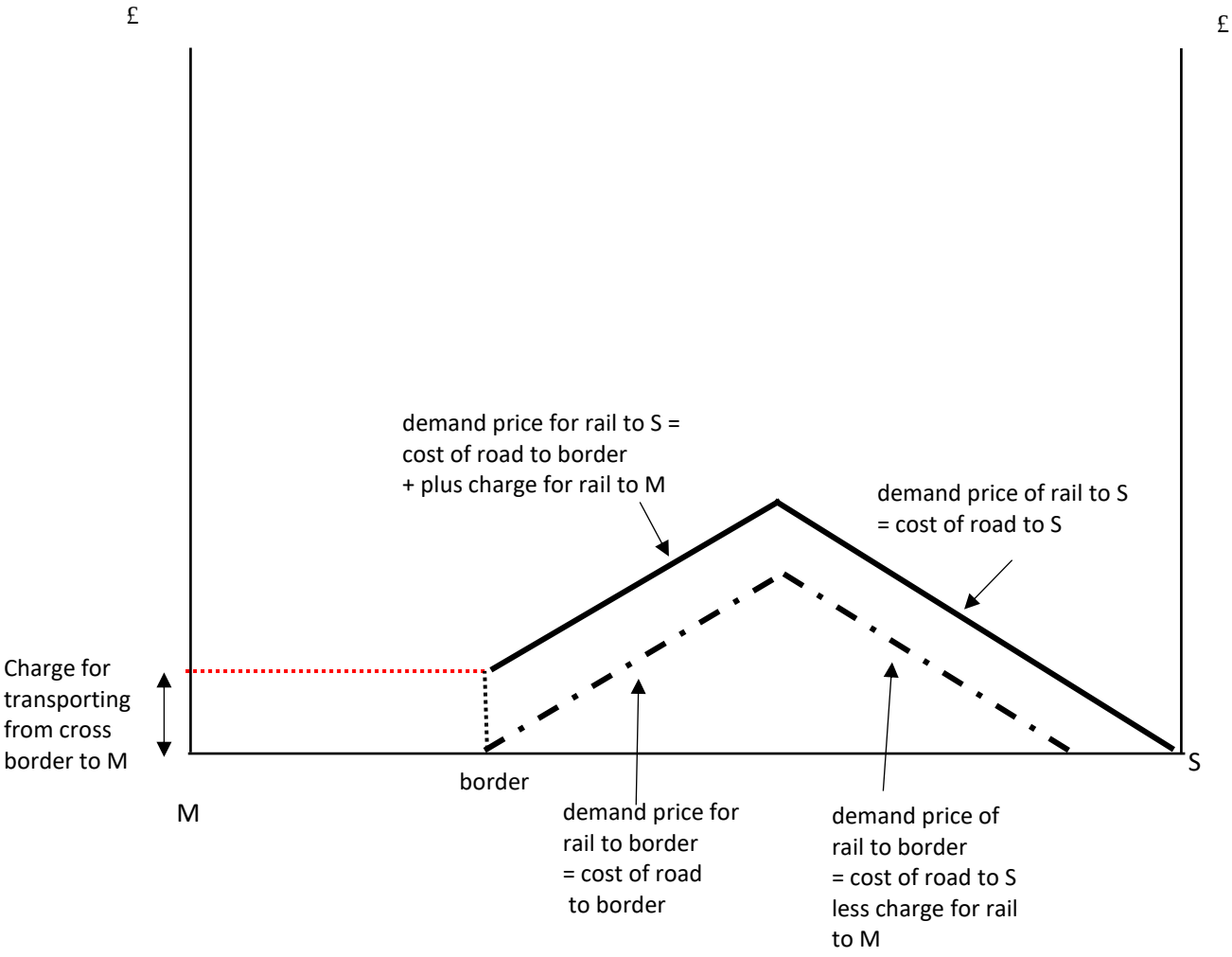
The demand price of for rail transport to the border. This equals the cost of road transport to the border, until the border is so distant that road transport to Sydney becomes the competitive alternative to rail. Then the demand price for rail to the border is not the road cost to S; it is the road cost to S *less* Mland's charge for cross border rail to M, as the benefit of rail to the border is reduced by that charge.[5] At some distance from S these two magnitudes will be equal. Nearer to the border the first is the smaller and, therefore, amounts to the demand price for rail to border. Nearer to S, the second is smaller, and amounts to a demand price for rail to the border.

Figure 3 represents the two demand prices as a function of location.[6]

[5] The pastoralist's willingness to pay for rail to the border is reduced by the amount of Mland's charge.

[6] It is easy to check that the demand price for rail to S and the demand price for rail to the border peak at the same distance from S.

Figure 3: Demand price as a function of location



For a pastoralist of a given location, only one of the two demand prices 'count'; the higher one. For this reason Sland railways will not offer rail transport to the border. For the very plain reason that, for any positive charge of rail to M, the demand price for transport to the border is, at every location, lower than the demand price for transport to S. And so, assuming the cost of rail transport zero, more profit must be made by sending traffic in Sland towards S, and charging the demand price for transport to S.

The analysis of Mland's pricing and supply of rail transport is analogous. By the same logic as above, one may, for any given charge of Sland for rail transport from the border to S, obtain the demand price of Mland pastoralists for rail transport to M, and their demand price for rail to the border. And by the same logic, for any positive charge of Sland to cross-border traffic, Mland will not offer rail transport to the border, but rail all freight to M.

Figure 4: With cross border charges and with zero rail costs there is no cross-border traffic

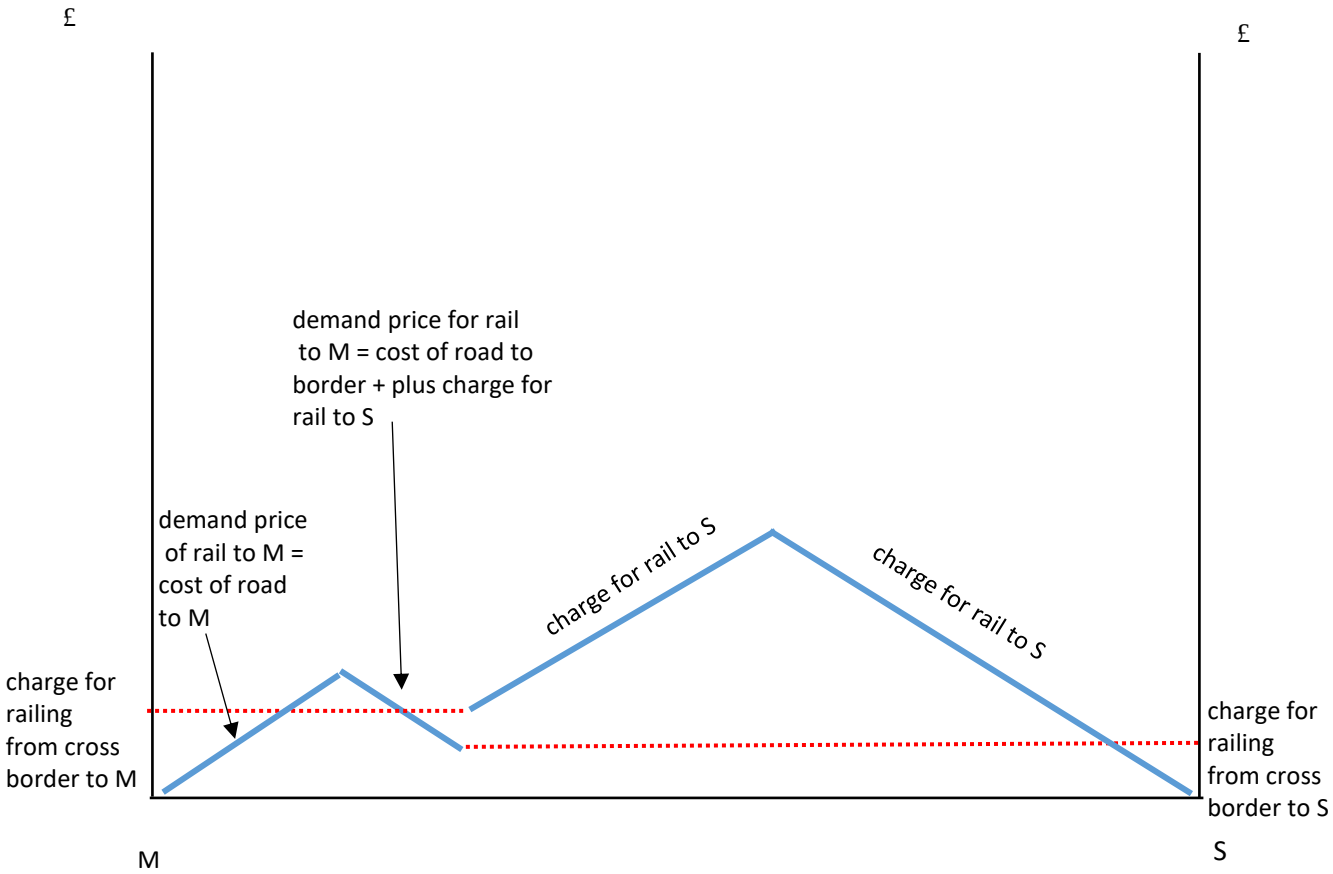
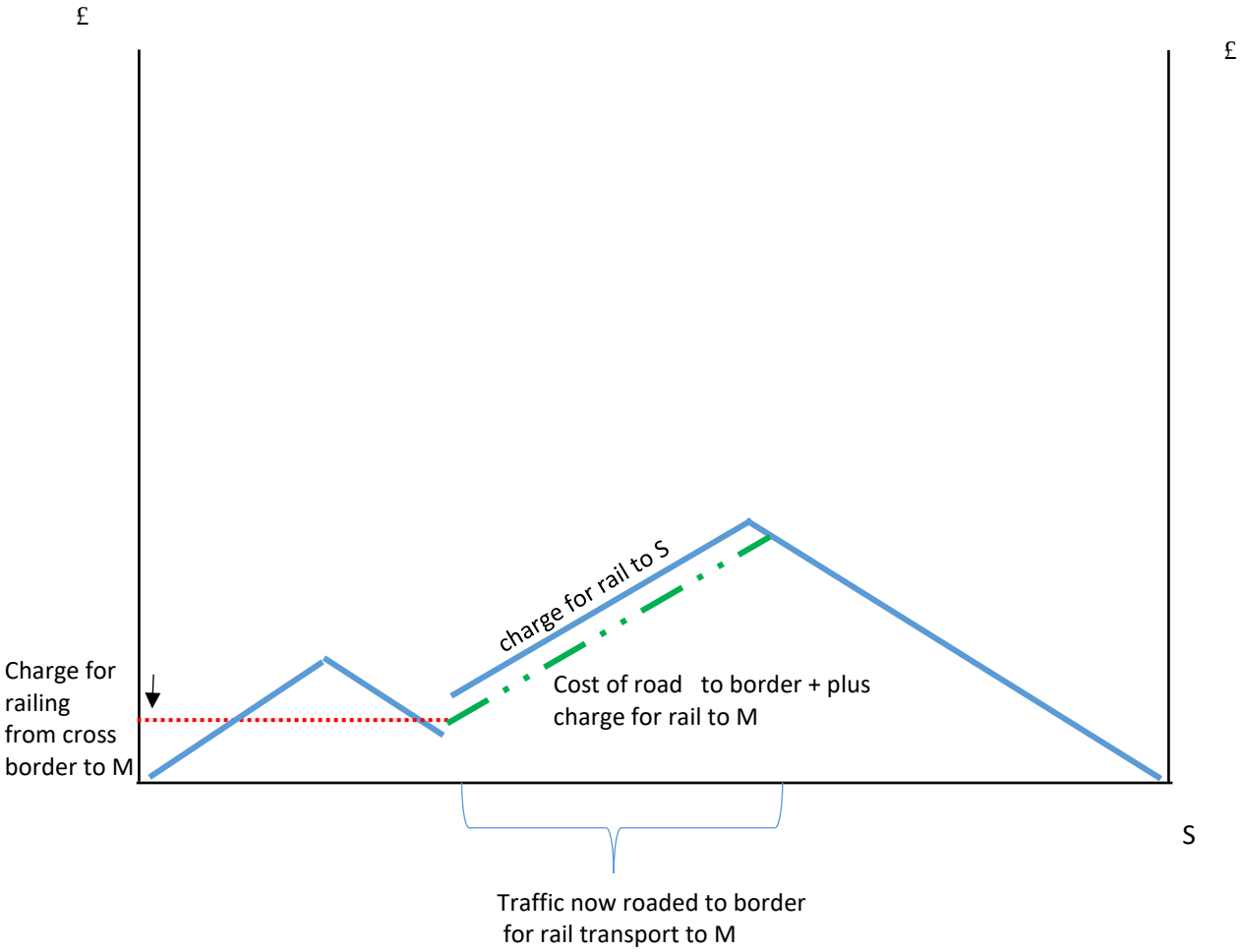


Figure 4 does not, however, depict an equilibrium. In Figure 4 the charge (of both states) for cross-border traffic is positive, despite revenues from cross border traffic being zero. There would be temptation to cut the charge. For at the existing tariff of charges, a cut in the cross-border traffic charge would obtain a considerable portion of cross-border traffic. Figure 5 illustrates the impact of Mland reducing its charge to cross-border traffic.

Figure 5: Mland increases cross-border traffic and revenue (from zero) by reducing cross-border charge



Thus competition will reduce charges for cross border traffic to zero.

With a zero charge for cross-border traffic, the demand prices of the two services offered by Sland are more simply stated.

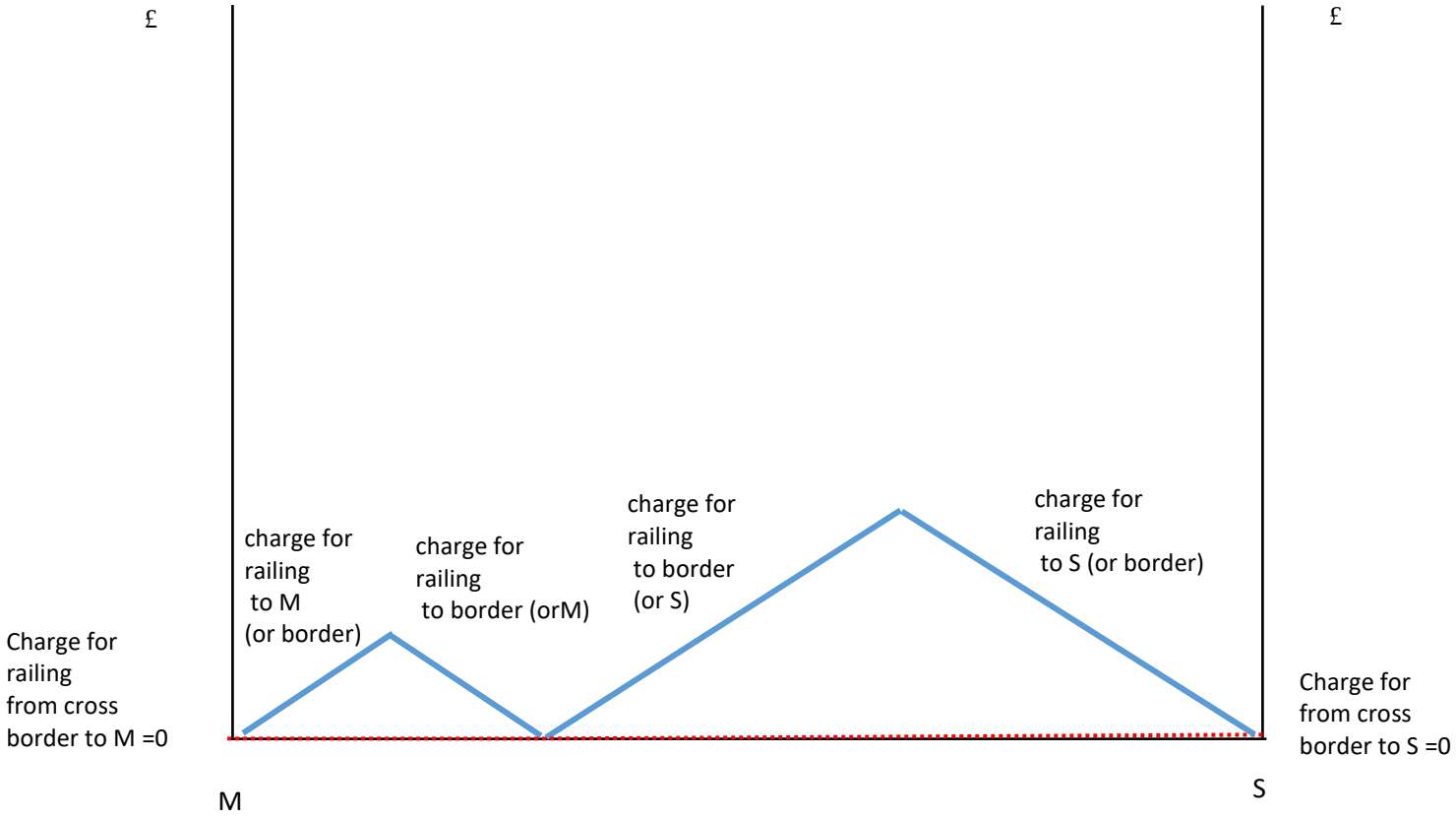
The demand price for rail transport to S is *either* the cost of road transport to S, *or* the cost of road transport to the border, whichever is the smaller.

The demand price for rail transport to the border is *either* the cost of road transport to S, *or* the cost of road transport to the border, whichever is the smaller.

Evidently, the two services – rail to the border and rail to S – *now have the same demand price for any location*, and so Sland is indifferent between railing to S or the border. For Mland a parallel logic applies.

The complete equilibrium is in Figure 5.

Figure 5: The equilibrium rail tariff with costless rail



In the equilibrium depicted in Figure 5 there is no determinate pattern movement for freight; any given freight may go to either the nearest port or the border. Both pastoralists and railways would be indifferent.

The welfare consequences of this division of control between two governments are unambiguously superior to single government. It is just as welfare efficient. And it is more equitable. For locations closer to the border than the port, now not all the surplus of producers is removed. More precisely, any pastoralist closer to the border than the port will have some surplus left over. The railway is now beneficial to those producers.

The conclusions of the analysis do rely on strong 'Nash' assumptions regarding competition. Each state apparently ignores the (seemingly predictable) response of the other to its own undercutting; namely matching undercutting themselves. And they do not collude. The two states could agree to charge some positive amount for cross border traffic; allowing each to charge a higher price for any traffic within their own state 'near' the border. This is the 'cooperative equilibrium' which coincides with the Leviathan.

Can the barebones model summarised in Figure 5 successfully predict the conduct in the 1890s of railways?

The model weakly does reproduce some of the phenomena that were so controversial.

In a weak sense Mland does offer 'preferential rates'. All Sland traffic is offered free passage to M, whereas all Mland traffic must pay something, even if only an epsilon. But to the extent Mland has 'preferential rates', it must be said Sland has them too; all Mland traffic is offered free passage to S.

In some sense Sland offers 'concessions' to border traffic. Traffic originating near the border is offered passage to S at a lower charge than traffic near the midpoint between the S and the border. That has the appearance of a concession. But since the cost of rail is by assumption zero that is a rather gratuitous concession.

For the model to be persuasive requires the introduction of transport costs.

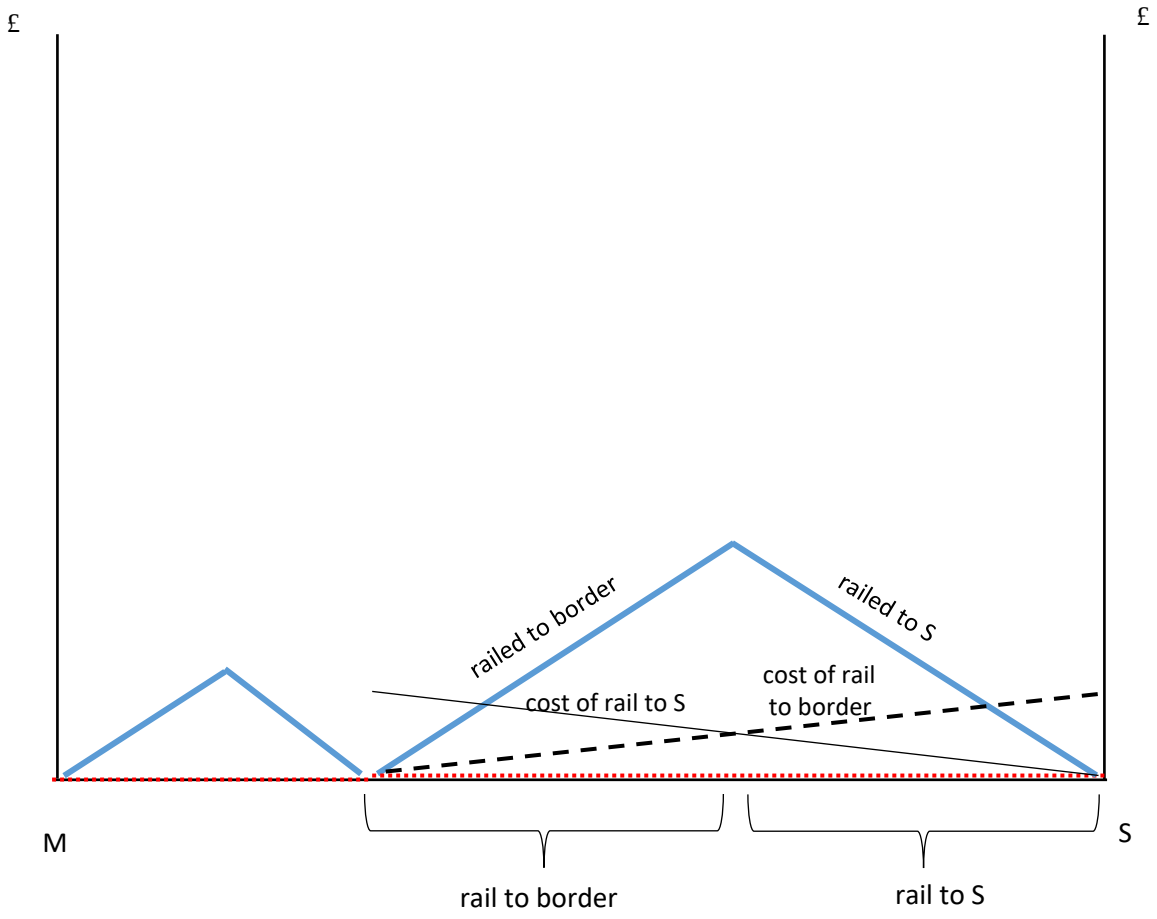
V An Elaborated Model: Costly Rail Transport in Sland

It is helpful to initially suppose an asymmetry in costs, and suppose that within Sland rail costs $R per mile, but within Mland rail remains costless.

With positive rail costs, a Leviathan would charge as it did namely the cost of road transport to the nearest port. But whereas with zero rail costs, the direction of traffic was indeterminate, and a matter of indifference to the Leviathan. Now all traffic originating closer to the border than S will be sent by a Leviathan to M, and all traffic originating closer to the S than the border will be sent to S.

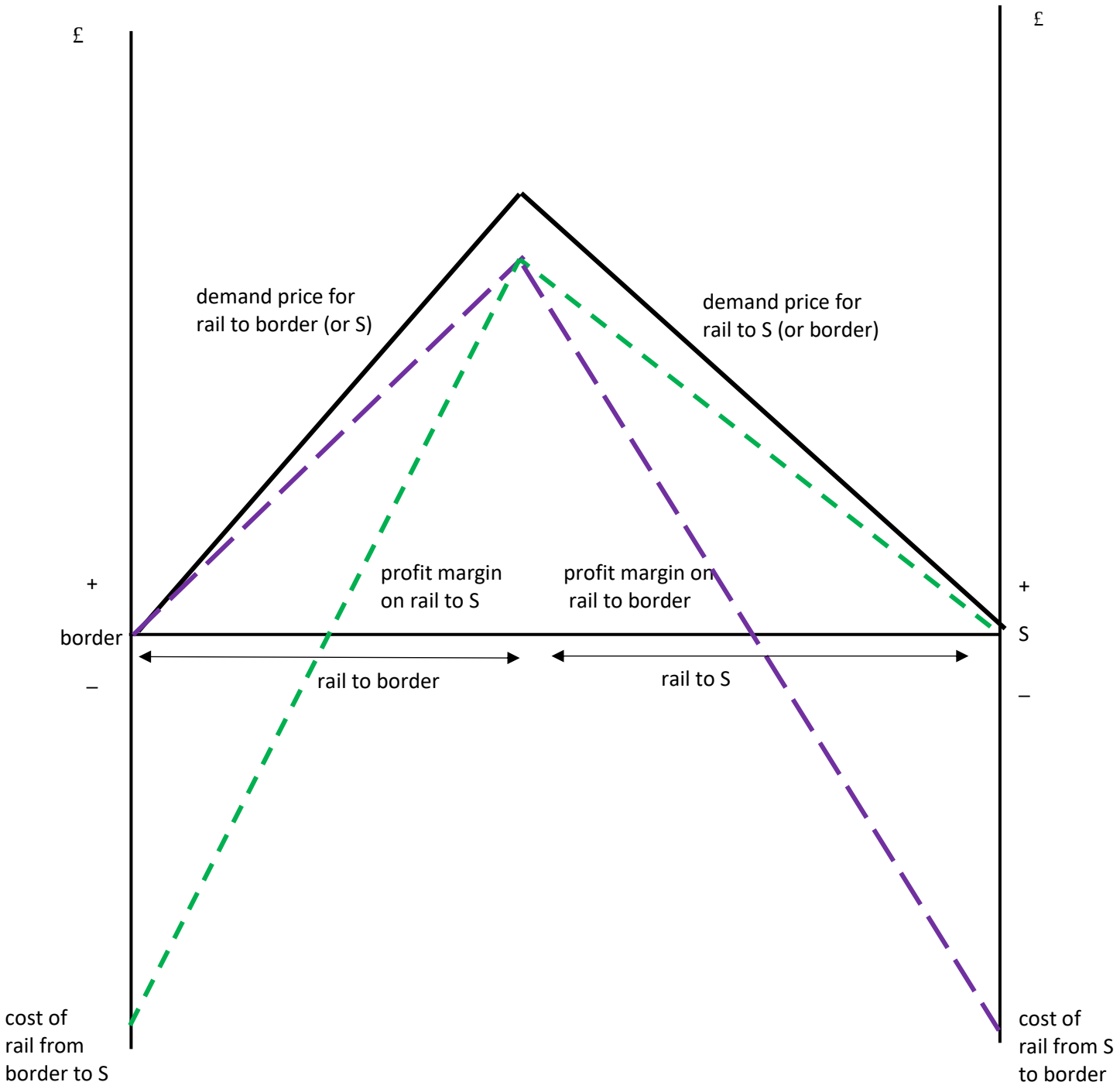
With positive rail costs, Sland will also change its pattern for transporting freight. With zero rail costs Sland was indifferent between railing traffic to S or the border. If we assume Mland charges nothing for cross border traffic, customers would remain indifferent. But with positive rail costs Sland will now not be. Near the border the cost of railing to the border is obviously smaller than railing to S. And, conversely, near S the cost of railing to S is obviously smaller than railing to the border. It is not difficult to see that, if Mland charges nothing for cross border traffic, then all traffic closer to the border than S will be railed to the border, and all traffic close to S than the border will be railed to S.

Figure 6: Positive cross-border traffic is an equilibrium with positive rail costs



The point is plain, but it will prove useful later to bring out the logic in a figure now.

Figure 7: Demand prices and profit margins assuming zero Mland charge for cross border traffic

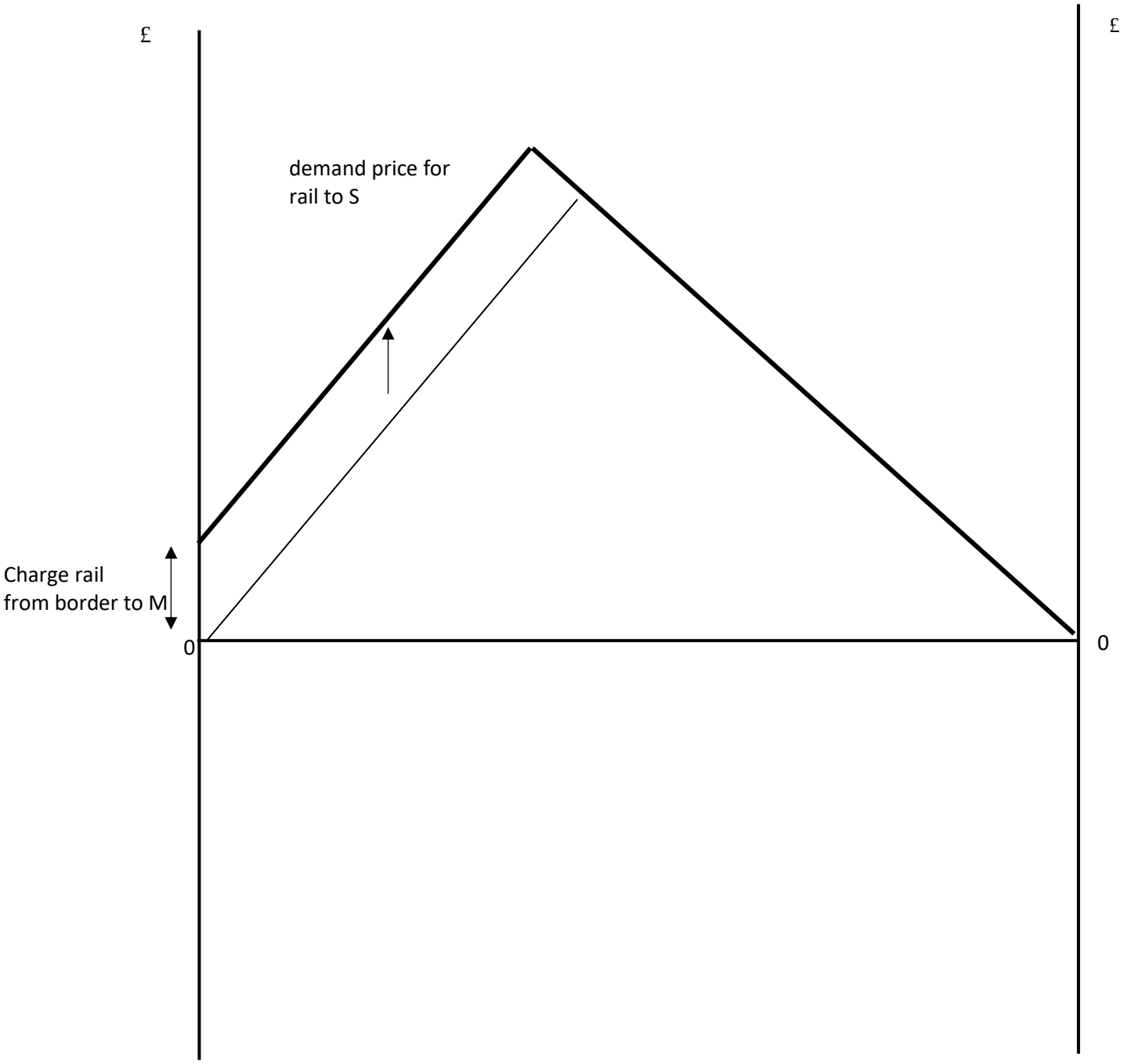


For all locations closer to the border than the midpoint, traffic is taken by Sland to border. There is no service to rail to S for these locations.

But the complete consequences of the introduction of rail costs have not yet been articulated.

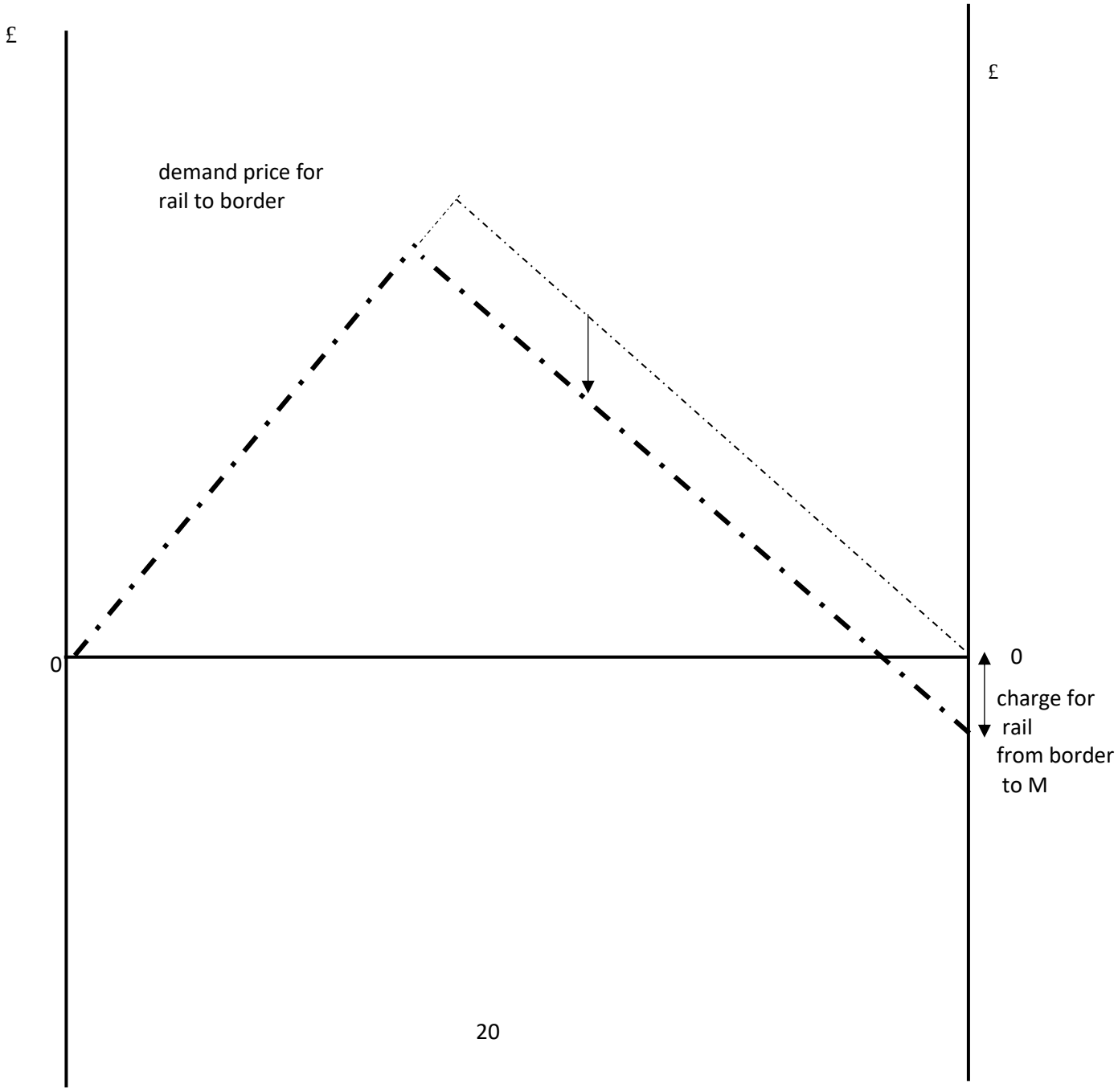
Figures 6 and 7 have implicitly assumed Mland's charge cross-border traffic is zero. If cross border rail traffic was zero it would be an equilibrium for Mland to charge cross-border freight zero for rail to M, in that there was no gain in revenue from charging a positive amount. But with the introduction of rail costs there will be a positive amount of cross-border rail traffic to M at zero charge; all traffic originating closer to the border than the midpoint will be railed to M. If Mland charged a positive rather than zero amount, the demand price for rail to S would rise by the amount of the charge, up to the point S was sufficiently close that the road was the relative alternative.

Figure 8: The demand price for rail to S increases 'near' the border if Mland charges for cross border traffic



Correspondingly, If Mland charged a positive rather than zero amount, the demand price for rail to border would fall by the amount of the charge, up to the point where the border was sufficiently close that the road was the relative alternative.

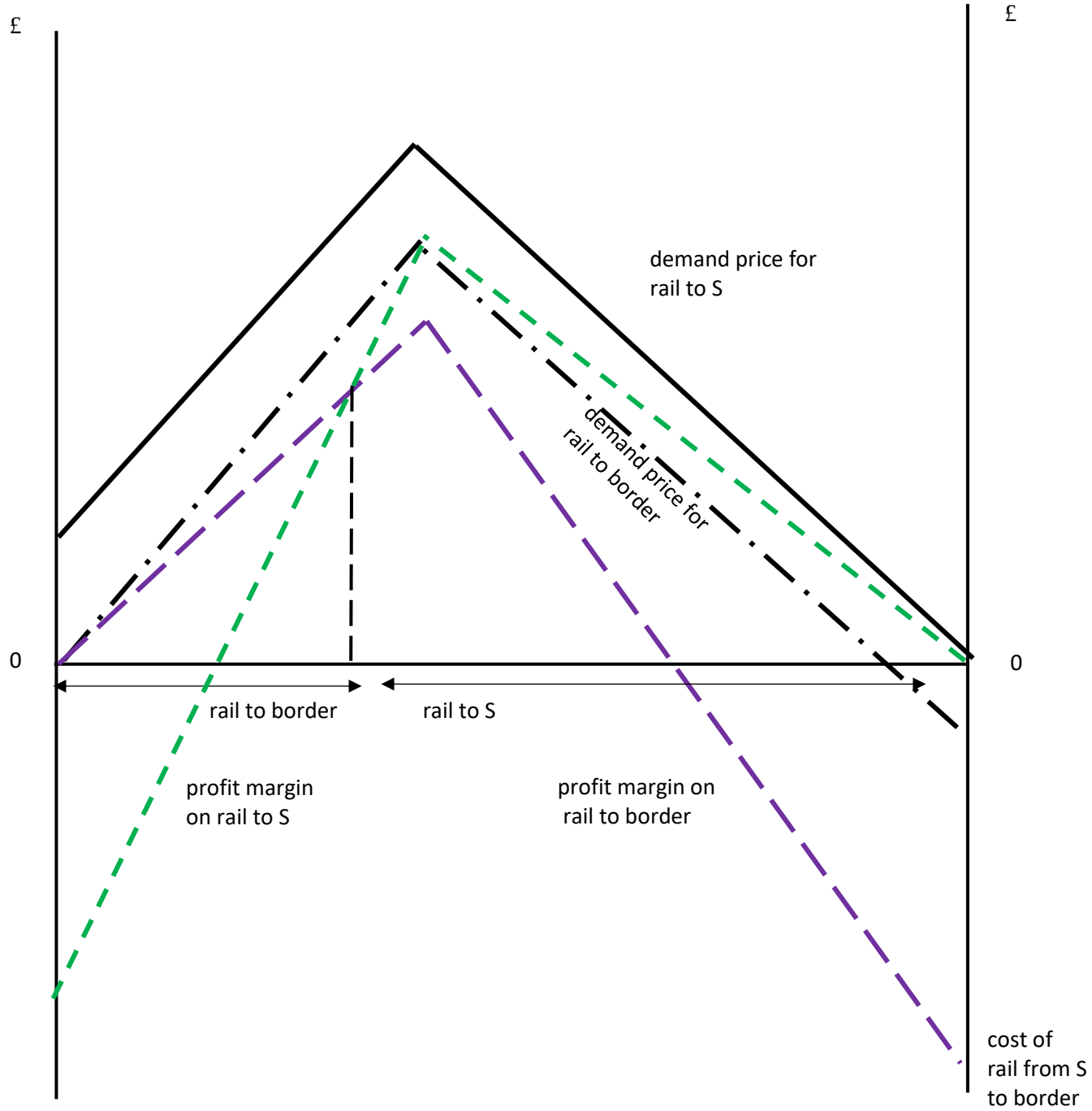
Figure 9: The demand price for rail to border decreases 'near' S if Mland charges for cross border traffic



As Figure 10 demonstrates, the upshot of Mland charging for cross-border traffic is that some Sland freight which previously was railed to the border would now be more profitably railed to S. Thus the demand for rail to the border (and thus demand for rail from the border to M) has fallen, *but is still positive.* There is, evidently, a 'demand curve' for rail to M; a negative relation between Nland's charge to cross border traffic, and the amount of cross border traffic. And for Mland there will obviously be some profit maximising charge.[7]

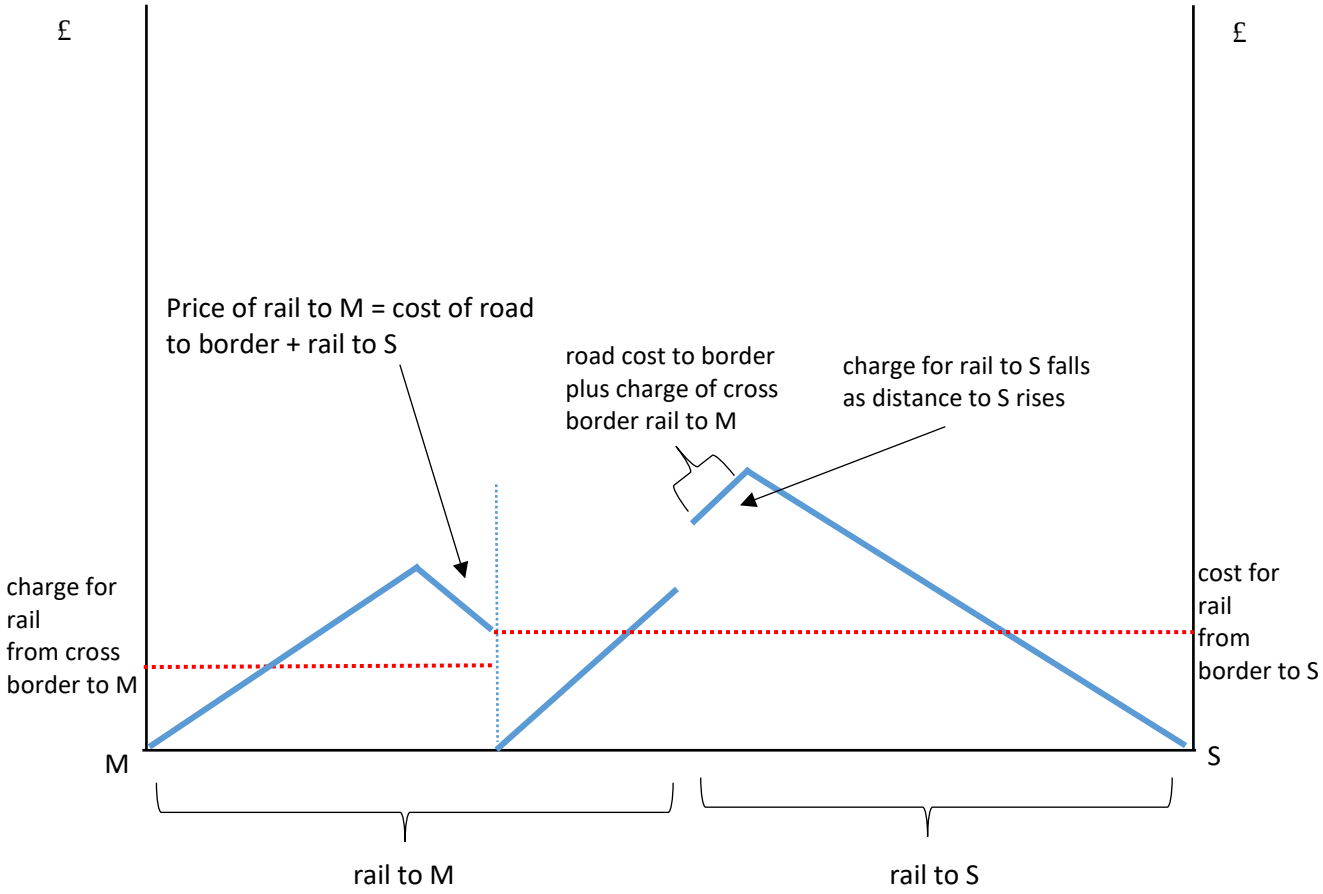
[7] There is also the question of traffic on the Mland side of the border, roading it to the border, and claiming to be Sland in origin. It can do that; but what is the benefit. Consider traffic right by the Mland border; it can appear at the border station at near epsilon transport cost, but its still has to pay the charge, and the extra charge from loading at its point of origin would be no larger than the saving in roading to the border.

Figure 10: Charging for cross-border traffic to M reduces cross-border traffic to M



What about traffic originating within Mland? What would it be charged to go to M? Might it even go to S? No. In effect, Mland traffic is charged just enough so that it would be still more expensive to go to Sydney. The lowest price Sland would be willing to offers traffic rail to S is the rail cost.[8] So Mland charges traffic at the border to M just an epsilon below that. And for traffic further from the border it increases the charge to take advantage of the road cost to the border.

Figure 11: The equilibrium rail tariff with costly rail in Sland



[8] If it offered it at less than cost, it would be improving to users but damaging to Mland rail.

Some points about the equilibrium:

1. As before, there is the approximate appearance of Mland preferential rates, in that the charge for Sland traffic to M is less than the charge of Mland traffic to M, at least in the proximity of the border. It is harder to say there exist 'concessional' rates, although that there is a stretch of locations where the charge of rail to S *falls* as the distance to S increases.
2. There is some social inefficiency in the direction of freight between S and the border (and thence M). 'Too much' Sland freight is railed to S: total rail costs would be reduced if more was railed to the border
3. *The welfare of the community is greater under divided control.* For whereas the Leviathan charge rail users the cost of road transport to the nearest port, Mland and Sland both charge their border regions less than that.

VI Costly Rail Transport in both Sland and Mland

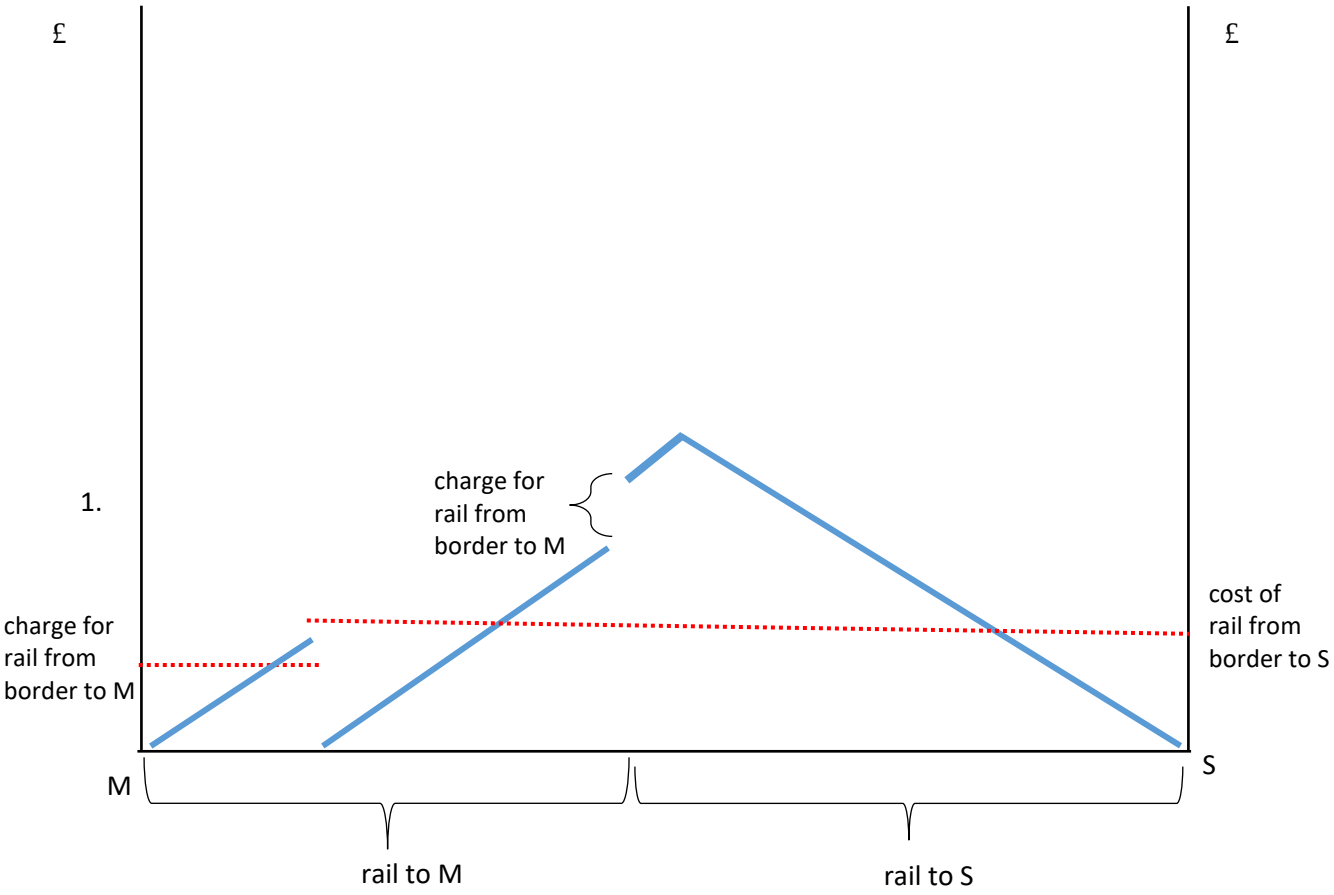
Do any of the conclusions above require revision if rail is costly in Mland as well as Sland?

(i) Border 'far' from S, 'near' to M.

In this situation, the cost of rail to S exceeds the cost of road to M. There can be no demand for rail from Mland to S, because the road to M would always dominate. Mland takes advantage of this situation by charging Mland traffic an epsilon less than road cost.

There remains, of course, a demand for rail to M from Sland, and it is charged on the same principle as before.

Figure 12: The equilibrium rail tariff with costly rail in both Sland and Mland if the border is 'far' from S

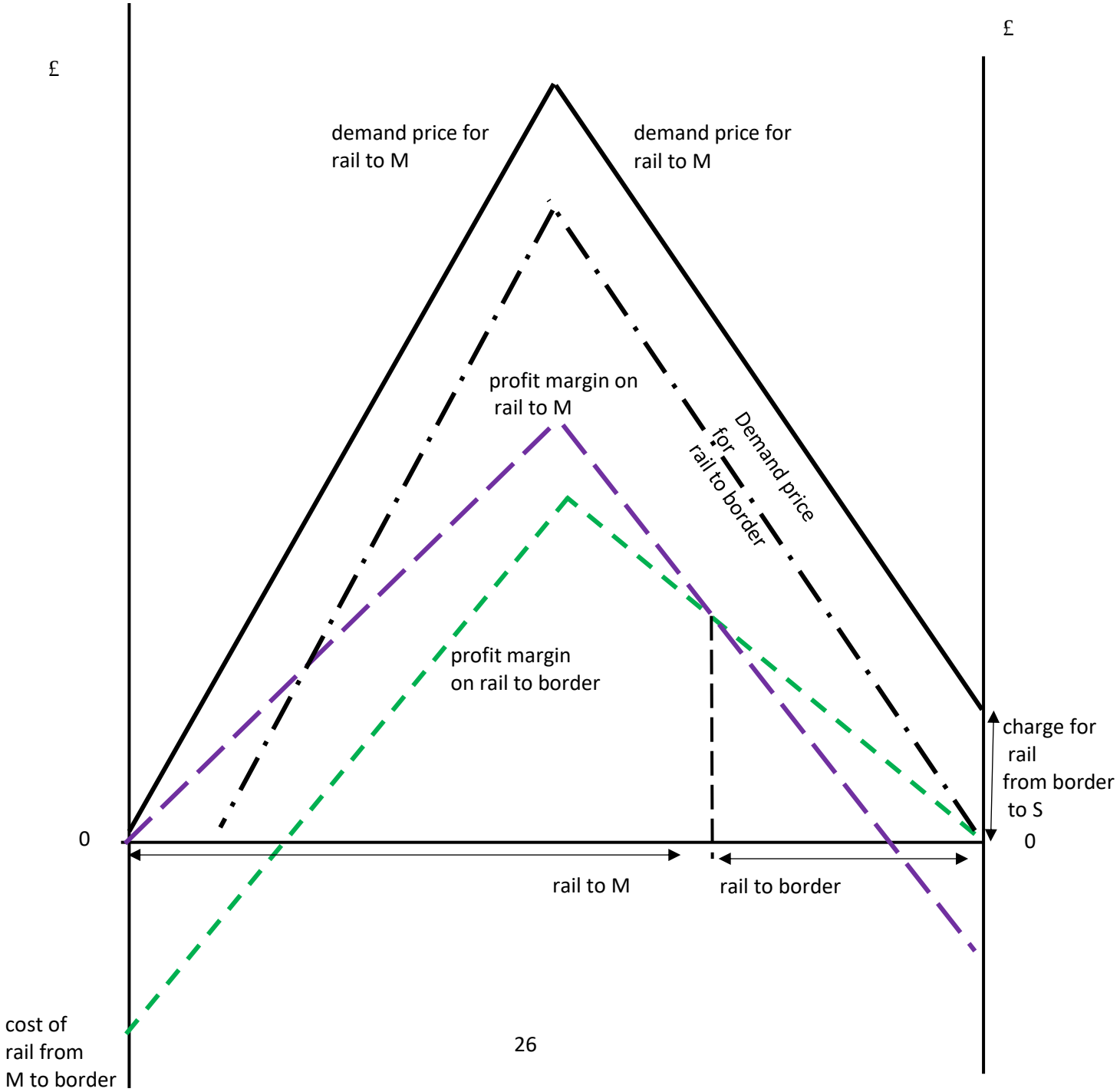


There is, as before, 'too much traffic' railed to S. But also as before Sland users near the border are charged much less than a Leviathan would. Notice Mland users are charged the same as the Leviathan.

(ii) Border not so 'far' from S; not so 'near' to M.

In this situation new traffic equilibrium occurs: *there is cross border traffic in both directions*. There is traffic from Sland to M, and there is traffic from Mland to S.

Figure 13: Cross-border traffic from Mland to S

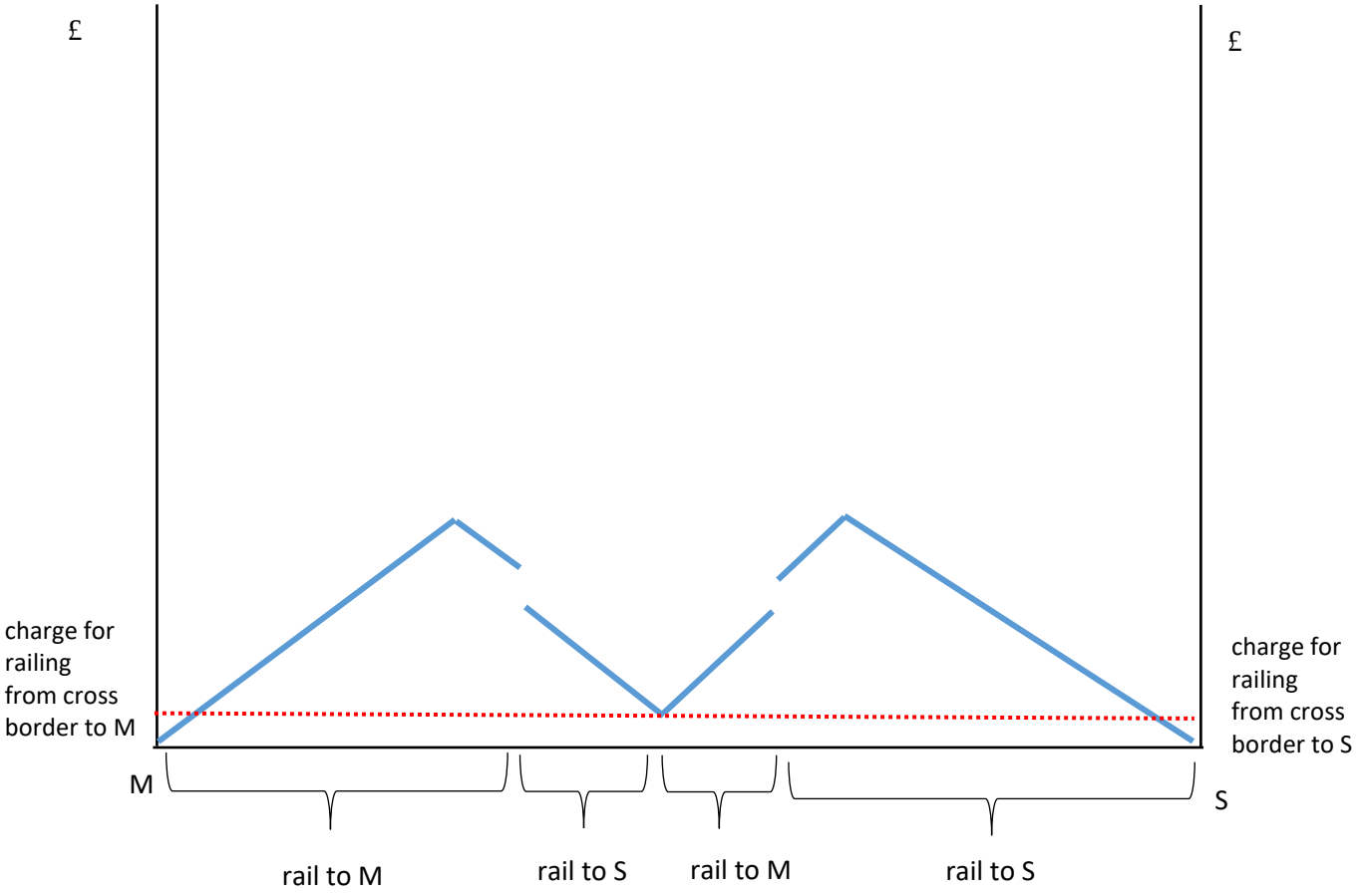


Inspection of Figure 13 reveals that if Sland's charge for cross border traffic is large enough, then profit considerations will imply that traffic is *not* sent to Sland, as in the previous section. And if the cost of rail from the border to S is large, the charge must be large. Thus if the border is distant from S there will no traffic to Sland (as in the previous sub section) but if the border is not 'distant' then there will be traffic in both directions.

In situation of rough symmetry between Sland and Mland, we can only expect both have cross-border traffic. Figure 14 underlines this conclusion, by depicting the situation of perfect symmetry.

Figure 14: The equilibrium rail tariff with costly rail in both Sland and Mland when the border is equidistant between S and M:

Freight railed to S despite M being nearer, and to M despite S being nearer



The situation represented by Figure 14 is certainly paradoxical: trains crossing at the border, heading in opposite directions, each travelling away from a closer port and towards a more distant port.[9] There is a social inefficiency with respect to rail costs in this situation. But as before, that cost inefficiency, comes with an equitable silver lining. Mland now has a border zone, like Sland, where traffic is charged less than Leviathan would. More generally, in both Mland and Sland many locations are charged less than they would be by a Leviathan Commonwealth, and none charged more.

VII Regulatory Policies

A popular alternative to outright Commonwealth control of the railways was their control by a regulator, who could impose any direction on the two state government's railways, but would obtain no income from its regulation. The maximand of such a regulator is debatable, so the paper will simply analyse the consequences of certain policies which a regulator might be tempted to take.

Forbid cross-border rail freight.

This abolishes competition in rail transport, with the consequence that the pricing pattern of Leviathan will be replicated, as each government charges a given location the road cost to the nearest port. The transport pattern, however, does not replicate the Leviathan; all traffic originating in Sland is (and must be) sent to S, while under Leviathan only freight with locations closer to S than M is sent to S.

Require freight to be railed to the nearest port.

[9] Or concretely, freight from Wangaratta being railed to Sydney, while freight from Wagga is railed to Melbourne.

It is easy to see that this policy guarantees each of Mland and Sland half the total market, and makes them monopolists within that half, with monopoly prices in consequence, and destruction of community welfare.

The policy does, however, reduce transport costs. The previous section concluded that, as long Sland is larger than Mland, then the freight of some locations will be railed to S even though M is nearer. The policy eliminates this cost-wasteful policy.

But for the community the price implications of this policy dominate the apparently attractive cost implications of this policy. Consider, in particular, the situation of complete symmetry between Sland and Mland; the 'paradoxical' even 'perverse', case of freight being transported across the border, in both directions, to a farther rather than the nearer port. In this situation, to require freight to be railed to the nearest port obviously puts an end to this. But it also is simply to give each government a monopoly over half of the total territory: Leviathan pricing would recur. There would be a 'social benefit'; but the community would lose. Recall

Social benefit of rail network

= cost of road transport – cost of rail transport.

= (cost of road transport - price of rail transport) + (price of rail transport – cost of rail transport).

= community benefit + government benefit.

The policy of requiring freight to be sent to the nearest port unambiguously benefits the government and disbenefits the community. Yes, there may also be said to be a social benefit – in that the benefit to the government exceeds the disbenefit the community - but the community benefit and government benefit

move in opposite direction, as the government captures all – and more! – of the social benefit.

Pricing at a percentage markup of marginal cost

On the face of it, pricing at a markup of marginal cost would make for rational transportation decisions: freight would be railed to S if and only if S is closer, something which is not so if (unregulated) railway control is divided between two governments. But this conclusion implicitly assumes that each government is required by the regulator to offer services to both the border and their port. If they were not, any freight whose point of origin was nearer the border than the port would not be offered rail to the border. They would railed only to the port, since absolute profit would be than railing to the border.[10] Clearly, to avoid such perverse outcomes, the offer of services, and not just their price would need to be regulated.

Pricing at marginal cost

Would pricing strictly at marginal cost be any better? Now each government has no incentive to offer any services at all. The task of a regulator is not a simple one …

VIII Extensions and Assumptions

The paper has assumed that all freight heads from some particular location on the line and towards a port. In other words, all freight is an export. But it is trivial to re-interpret the model so that all freight heads from a port and towards a particular location on the line. The charges previously predicted for location-to-port transport, are now charges for port-to-location transport.

[10] And any freight whose point of origin was nearer the port than the border would only be railed to the border!

Freight railed from one location on the line to another location on the line, are not modelled, even though such traffic obviously existed.

The model assumes only one product at each location. On the face of it, the model could be easily extended to the existence of multiple products, each with their own tariff and transportation pattern, determined the cost of road transport and rail transport of the product.

Simple extensions to the multi-product economy do not recognise that thus far that the paper's modelling of rail costs has been crude, in simply assuming the cost of any assignment of freight is linear in distance, and otherwise parametric. It has ignored economies of scale that exist in railing. Thus it has been implicitly that a railing of a single freight car of freight would cost one eighth of railing eight freight car of freight. And obviously this is not the case (the crew, for one thing, would not be one eighth the size). It has also implicitly assumed that stations are free: so every location is a station.

IX The upshot

In the event Section 102 of the Constitution decreed,

102. The Parliament may by any law with respect to trade or commerce forbid, as to railways, any preference or discrimination by any State, or by any authority constituted under a State, if such preference or discrimination is undue and unreasonable …

And who was to judge if '*if such preference or discrimination is undue and unreasonable'*? That was entirely left to the Inter-State Commission, created by Section 101.

no preference or discrimination shall, within the meaning of this section [102], be taken to be undue and unreasonable, or unjust to any State, unless so adjudged by the Inter-State Commission

Thus the whole structure of 'preferences' and 'concessions' would stay or fall at the pleasure of a new Inter-State Commission.

The ISC was created only in XXXX by the … But the possibility of the ISC finding against any given state constituted a risk to all states, and the consequence was the states coming themselves to an agreement to cancel all preferences and discriminations. Thus on 14 January 1905 the *Age* carried the headline.

Competitive Rates

Agreement Reached

Inter-State Commission Not Needed

It reported 'an understanding as to competitive rates has been reached by the Commissioners of New South Wales, South Australia and Victoria, and effect will be given to this arrangement at us early a date as practicable. The 'substantial rebates' of Victorian railways and the 'wholesale cutting' of New South Wales railways, said the *Age*, were at an end.

References

La Nauze, J.A. (1972). *The Making of the Australian Constitution,* Melbourne: Melbourne University Press.

Patmore, Greg (1988). 'Systematic management and bureaucracy: the NSW railways prior to 1932', *Labour and Industry*, 1(2), 306-321.

Pincus, Jonathan (2016) 'Socialism in Six Colonies: The Aftermath', *Only in Australia: the history, politics and economics of Australian exceptionalism* William O. Coleman, ed., Oxford, United Kingdom ; New York, NY : Oxford University Press.

Withers, G., T. Endres and L. Perry (1985).'Australian Historical Statistics: Labour Statistics', *Source Paper in Economic History*, 7, Australian National University.