

# Jevons In Australia: A Reassessment\*

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*Historians of economic thought have generally considered that W. S. Jevons' Australian work on political economy has little significance. This article presents three arguments for reassessing that account. First, while in Australia, Jevons formulated the basic premises of his Theory of Political Economy. Second, the key influence on him during this period was not D. Lardner, as previously thought, but Professor Maurice Pell of Sydney University. Third, in Australia, Jevons formulated the project which culminated in the publication of his Theory—the derivation of 'laws' of income distribution, showing economic agents were rewarded according to their contribution to production.*

William Stanley Jevons arrived in Australia on 6 October 1854 and returned to England in April 1859. For most of that time he was employed as an assayer at the Royal Mint, Sydney.<sup>1</sup> While Jevons'

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<sup>1</sup> On Jevons' activities in Australia, see Konekamp (1972) and La Nauze (1949). For a considerable part of his time at the Mint, the job was virtually a sinecure (Konekamp, 1962 p. 257). The New South Wales State Archives have recently obtained the correspondence files of the Royal Mint which cover Jevons' time as an employee. The files do not seem to contain much information on him although they do record that, along with the other assayer, Francis Müller, Jevons obtained a salary increase in May 1855. (His salary was then £675—Konekamp, 1962, p. 257). The increase was agreed to by Captain Ward, Deputy Master of the Mint, on the condition that no more assaying work be done for outside parties. Later the same month the Oriental Bank, Sydney, protested to Ward about the new condition. (Information from P. Timms, Assistant Curator, Royal Mint and Hyde Park Barracks Museum, Sydney). Some months later, unaware of the salary rise, Jevons' iron-merchant father wrote to his son on tactics: 'I don't think you should *strike* for it but I think you should *tease* the Cap [Ward] and don't do too much for your £500, work slow and put on

activities in Australia as a meteorologist and even as a photographer<sup>2</sup> have been considered to be historically important, historians of economic thought have generally considered his work on political economy, during the same period, to have little other than biographical or bibliographical significance.<sup>3</sup>

This paper presents three major arguments for reassessing and, indeed, rejecting that conventional view. First, in Section I, it is shown that while in Australia Jevons formulated the basic premises which underlay his 'Notice of A General Theory' (1862) and, hence, the *Theory of Political Economy* (1871).<sup>4</sup> The key influence in that formulation was some work by Morris Birkbeck Pell, at that time Professor of Mathematics and Natural Philosophy at the University of Sydney. Two secondary influences were a lecture by the Reverend John Woolley—Principal of, and Professor of Classics

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your hat at 4 o'clock' (Black, 1973, p. 173, OE). In April 1855, the father had also urged the son to drum up some Sydney sales for the family firm (*ibid.*, p. 139). In this paper, OE = original emphasis; EA = emphasis added.

<sup>2</sup> On Jevons as photographer, see Burke (1955).

<sup>3</sup> See Section I.

<sup>4</sup> Hereinafter TPE.

at, the university—and Archbishop Richard Whately's *Introductory Lectures on Political Economy* (1831). The second major argument, contained in Section II, presents direct evidence that Dionysius Lardner's *Railway Economy* (1850) could not have been the pivotal influence in formulating the basic premises. This argument refutes the conventional view that Lardner's text was of key importance at that time for Jevons' work. In Section III, we examine the social context in which Jevons' basic premises were produced. Finally, Section IV presents the paper's third major argument. This is that, while in Australia, Jevons formulated the project which culminated in the publication of TPE—a theory of the iron laws of income distribution, which showed that, in the long run, all economic agents received their 'due recompense' according to their contribution to production.<sup>5</sup> For these three reasons, the Antipodean interlude need no longer be relegated to the historical *curiosa* shelf. Rather, it can be depicted as having played a crucial role in the process of production of Jevons' contribution to the 'marginal revolution'.

### *I The Formulation of Jevons' Basic Premises*

There is clear evidence of Jevons mapping out key aspects of the 1862 'Notice' and therefore TPE in a series of letters written in 1859 and 1860.<sup>6</sup>

<sup>5</sup> For reasons of space this assessment of TPE cannot be examined here. It is argued at length in my ph.d. thesis from which this paper is taken.

<sup>6</sup> There are three major letters:

(i) The first written from Australia (30 January 1859), sketches some key notions of Jevons' later capital theory. He commented on the 'sacrifice' of 'present ease and amusements' (Black, 1973, p. 362) which were made during education and study, so as to obtain a 'return' over and above the 'sacrifice', in later years. Such '*preparation and performance*' was made analogous to the relation between '*Capital and Labour*' (*ibid.*, p. 359, OE), for the person who was so trained could be more 'valuable' than, for example, a large number of unskilled navvies (*ibid.*, p. 360). The relation between the couples, preparation and performance and capital and labour, was not one that had been worked out previously, but it was 'one of those deeply laid and simple propositions of Economy, which I hope some day to work out' (*ibid.*).

(ii) A letter (1 June 1860) where it is stated that 'in the last few months I have fortunately struck out what I have no doubt is the *True Theory of Economy*' (*ibid.*, p. 410, OE). The theory was 'entirely mathematical in principle', provided a theoretical foundation for 'the law of Supply

and Demand' in terms of utility, while the 'definition of capital and law of the Interest of Capital are as far as I have seen quite new' (*ibid.*, p. 411). It has been argued that Jevons' 'true theory of Economy' was formulated on 'one identifiable day' (19 February 1860) and that the 'idea of a new method came to him before he had arrived at the view that utility should be the starting point of value theory' (La Nauze, 1953, pp. 357, 358). There is also an important letter of 28 November 1860 (Black, 1973, p. 422).

(iii) Such evidence can be supplemented by earlier remarks in another letter from Australia (28 February 1858), that political economy was 'a sort of vague mathematics which calculates the causes and effects of man's industry, and shows how it may best be applied' (Black, 1973, p. 322).

<sup>7</sup> See Black (1972) and (1972a).

<sup>8</sup> Jevons was never to depart from this position—cf. footnote 18.

the results of competition revealed 'man's' relative worth;<sup>9</sup>

(g) 'man' should be conceptualized as a pleasure-maximizing, pain-minimizing, calculating individual.

La Nauze's pioneering work on Jevons in Australia (La Nauze, 1949), initially published in a slightly different form in this journal (La Nauze, 1941), drew attention to a series of letters Jevons wrote to the *Empire* newspaper, edited by Henry Parkes, discussing railway construction criteria and sales of unoccupied land by the State. However, while considered important in a Jevonian biography or bibliography, any other significance of the letters was effectively dismissed since they were not 'of enduring value. There is nothing in them to compare *in interest* with the reflections on the nature of capital contained in a letter written in January 1859' (La Nauze, 1949, p. 32 EA). It will be argued here that, on the contrary, the letters are of immense interest, not simply because the discussion 'caused Jevons to give serious study to economics', especially with regard to the question of 'capital' (Konekamp, 1972, p. 27), but also because the letters articulated the basic premises (a) to (e) identified above. Moreover, extracts from Jevons' journal indicate the role of John Woolley and of Richard Whately's text in the formulation of the crude utilitarian propositions contained in basic premises (f) and (g). The dating of the relevant letters, reading of political economy texts and journal entries are summarized in Table 1.<sup>10</sup> The letters are examined first (Section I(i)) followed by the journal entries (Section I(ii)).

#### (i) *The Letters*

At the inaugural meeting of the Philosophical Society of New South Wales on 9 May 1856, the Governor-General, Sir William Denison, read a paper on 'Railways' (Denison, 1858). The Sydney-Parramatta line had been completed in September 1855 and Denison's paper discussed the possibility of further railway construction. The principal

question concerned the financing of the enterprise since it was clear this would have to be carried out by the State.<sup>11</sup> Jevons, a member of the Society, had read Adam Smith's *Wealth of Nations* some months before, but from his diary entries 'it is evident that this [i.e., 'The Railway Question'] gave a specific focus to the general interest in political economy which he had been developing for some months, and that he began to compose a letter on the subject on 1 June 1856' (Konekamp, 1972, p. 235n).

While recording the economic superiority of railways as compared with roads in England, Denison's paper also made an assault on the costs of unrestrained competition in the English railway system.<sup>12</sup> Denison then examined the Australian problem by posing two questions. First, using a rough cost-benefit analysis<sup>13</sup> comparing railway and road construction, should further railway construction take place? Second, if the answer to the first question was yes, how should the project(s) be financed? Should fares and charges be the only source of revenue or should general taxation revenue be utilized, allowing some reduction in fares and charges? He argued that the benefits from railways were of two types—'direct' and 'indirect'. The direct benefits for commodity traffic were reduced monetary costs while for passenger traffic the saving was primarily in terms of travelling time. These benefits would be reflected in 'the profits of the railway as a speculative investment of capital' (Denison, 1858, p. 11). The indirect benefits, the railway external economies, would consist of 'a stimulus to production' and of increased prices of land on which it would become profitable to produce for a market. This last point was of key importance for the State because of its large holdings of unoccupied land. Railways could thus promote a 'denser population' and 'the general development of business of every kind' so that the colony would become 'prosperous and powerful'. Denison then argued that while carriage revenue

<sup>9</sup> 'Worth' included all aspects of social position and not simply income received or wealth accumulated. This point is important in view of Jevons' later espousal of Herbert Spencer's Social Darwinism in the March 1873 edition of *Nature* (Black, 1977a, p. 4).

<sup>10</sup> Letters 1 and 2 which make clear Jevons' indebtedness to Pell's arguments are not listed in La Nauze's (1949) bibliography. T. W. Hutchison (1968, p. 259) lists only Letters 3 and 4.

<sup>11</sup> See Section III.

<sup>12</sup> Having given a compact historical survey of the functions of railways in England, Denison argued that the comparatively low rate of interest on money capital sunk in railway construction in England, was due to too many lines having been built in comparison to potential carriage. Such a state of affairs was thus 'principally due to an unwholesome system of competition' (Denison, 1858, p. 10).

<sup>13</sup> Denison's paper used the terms 'costs' and 'benefits'.

TABLE 1

Year	A Railways and Land Sales Letters		B Reading of Political Economy Texts	C Journal Entries
1856	1. 19/8	To the <i>Sydney Morning Herald</i> on railway construction criteria	January-March: A. Smith, <i>Wealth of Nations</i>	
			November-December: Burton's <i>Political Economy: Railway Statistics</i> (Weales Series)	13/9 Remarks on utilitarian philosophy
1857	2. 10/2	To the <i>Empire</i> on railway construction	4/2-6/3: J. S. Mill, <i>Principles of Political Economy</i> , Vol. II	
			26/3-5/4: R. Whately, <i>Introductory Lectures on Political Economy</i>	5/4 Remarks on Whately's <i>Lectures</i>
	3. 8/4*	To the <i>Empire</i> on railway construction and land sales	22/4: obtains D. Lardner, <i>Railway Economy</i> (read April-May)	
			18/5-20/6: J. S. Mill, <i>Principles</i> , Vol. I	
	4. 24/6	To the <i>Empire</i> on land sales	During 1857 also read: Malthus, <i>Principles of Population</i> ; H. Martineau, <i>Illustrations of Political Economy</i>	
	5.29/12	To the <i>Empire</i> on 'Railway Economy'		

References: La Nauze, 1949; Black and Konekamp, 1972, pp. 26-7.

\* La Nauze's dating.

would enable the construction revenue to be recouped, the indirect benefits would not be reflected in the railway's accounts. Hence, it would not be 'wise' to expect a rate of return on the investment but, rather, to attempt simply to cover costs on a zero profit basis. Moreover, because indirect benefits would not be registered in carriage revenue, Denison seemed to suggest that fares and charges should be lowered and any revenue short fall could be funded from general taxation revenue (*ibid.*, pp. 12-13).

Professor Pell replied to Denison at a Philosophical Society meeting two months later (11 July 1856). Pell argued that if carriage revenue could not cover construction expenditure, 'working expenses' and provide a return at least equal to the 'current' rate of interest, any railway

would be 'a loss to the community'. This was the general 'principle' of his paper—a railway had to be 'self-supporting' (Pell, 1858, pp. 125, 126). The price which users were prepared to pay for railways would reveal the benefits they obtained and, hence, by adjusting charges to obtain the point of maximum gross revenue, the railway accounts would show the point where total user benefits precisely equalled total user costs. Moreover, because the process of cost and benefit equilibration resulted from the 'free exercise of their [i.e., users'] own judgement' and since fares and charges were in effect a tax, this method of railway funding would constitute 'a perfectly equitable tax' (*ibid.*, p. 126). Total railway revenues would therefore reveal 'the exact measure of its value as estimated by the whole community' (*ibid.*,

p. 127). Such a conclusion required an identification of 'personal' and 'social' benefits and, for commodity traffic, this was simply asserted in terms of the producer of commodities acting 'to a certain degree . . . as the agent for every person in the whole country in any way interested in the transaction' (*ibid.*, p. 126). The carriage costs could be spread. If, for example, commodity carriage charges were increased, then some of the increased costs could be passed on to consumers through higher prices. The spreading of costs, so as to equilibrate them with benefits, constituted a 'law' (*ibid.*).

Pell did make the important point that increasing the value of privately owned land meant 'a concentration of wealth' which should not be confused with increasing the wealth of all members of the colony (*ibid.*, p. 127). But much of his argument appears dogmatic in comparison to that made by Denison. That situation seems to have been dependent on two factors. First, a difference over the relative benefits of simulating 'free commercial transactions'. While Denison argued such competition could be 'unwholesome' in its effects, Pell would brook no such qualifications. He concluded his paper with the following:

the time has not yet arrived for constructing railways in this colony. It is generally allowed that all artificial restrictions upon trade are detrimental to the prosperity of a community, and I believe that artificial stimulants would be found equally so [*ibid.*, p. 128].

The second reason for disagreement with Denison was over the role of railways in promoting production and increasing population.<sup>14</sup> (Any short-run population increase would presumably come from immigration.) For Pell, the colony's markets were simply too small to enable further railways and he dogmatically brushed aside Denison's argument on future production and population increases, with the assertion that such an argument was 'contrary to reason and experience' (*ibid.*). The difference over potential market sizes seems to explain why, in his arithmetical illustrations, Pell insisted on treating railway expenses simply as an additional cost while

Denison argued that railways could lower carriage costs in comparison with roads.

Denison was to produce a more sophisticated paper in 1857<sup>15</sup>, but it was the arguments of his first paper to which Jevons addressed himself in a letter to the *Sydney Morning Herald* (19 August 1856) signed 'Honestas'. He simply repeated Pell's arguments even directly citing Pell's paper at one point. Jevons wrote that provided tolls and fares were adjusted to the maximum possible rates, the monetary return on the railway revealed 'the true measure of its usefulness and value to the whole community'; that the adjusted tolls and fares were payment for 'the fair cost of carriage', and that, contrary to Denison and others, railways should not be financed in any way from general taxation. For the use of tolls and fares was the 'justest method' of taxation since payment/cost was in 'exact proportion' to the benefit received. Hence the conclusion that there should be no investment in railways 'but with the probability of its being self-maintaining, within a reasonable period after its completion' (Black, 1973, p. 236).

While ruefully acknowledging that such 'abstract' arguments placed Pell in a minority, Jevons simply repeated them. This was also the case in a second letter, on railway construction criteria, to Parkes' *Empire*, six months later (10 February 1857).<sup>16</sup> Signed 'O', it was claimed that when charges were 'adjusted to the maximum paying rates, [they provide] an exact measure of the benefits conferred, direct or indirect'. Unless the railways provided 'an equivalent return' to alternative investments—5 per cent of funds within five years—the money capital expended was 'a dead loss': 'I only say let the paying principle be maintained in these things' (*ibid.*, pp. 265-6, OE).

In a subsequent letter, again signed 'O', to the *Empire* two months later (8 April 1857), Jevons made more clear the process by which costs and benefits would be equilibrated and showed how Pell's 'principles' were not restricted to the

<sup>15</sup> cf. footnote 35.

<sup>14</sup> For Denison, increasing production would result in increased revenue for railways from commodity traffic and increased State taxes, while increasing population would increase railway revenue from passenger traffic and also increase taxation revenue.

<sup>16</sup> Jevons was unimpressed with the quality of the *Sydney Morning Herald* and the *Empire's* editor. In 1858 he wrote that the *SMH* was 'a milk and water affair', while two years earlier he referred to Henry Parkes in this way: 'the [parliamentary] opposition consists in fact of a lot of clever but blackguardly pure democrats with Parkes, the editor of the *Empire*, Dr. [J. D.] Lang . . . and the members for Sydney, altogether called the "bunch" at their head' (Black, 1973, pp. 346, 247-8, OE).

consideration of railways but could be generalized so as to cover all commercial transactions. For the letter also examined the policy of selling unoccupied land owned by the State, where a minimum or 'upset' price had been set. Jevons argued against the upset price system, since the State should rely on 'the *natural price* or exchangeable value' of the land: 'Freedom for all commercial transactions is the spirit of improved legislation and I see no reason why it should not be applied to lands' (*ibid.*, p. 287, OE).

With regard to railways, any consideration of 'indirect effects' was 'illegitimate' and the 'only equitable method of taxation' for financing the railways was tolls and fares. The reasons for this were, first, that such payments constituted 'a fair and voluntary exchange' (*ibid.*, p. 285) and, second, that total payments made indicated whether the advantage gained in using the railways was measured by the price. For if the advantage/benefit was greater than the price/cost, charges could be increased and total revenue would increase. Revenue would fall in the opposite situation. Such

*stimulation* . . . [or] *retardation* will, I believe, take place with mathematical exactness, as in the theory of other commercial operations, a fair time only being allowed for things to reach the point of equilibrium, and then I conceive that the monetary returns of a railway, with properly adjusted tolls, will exactly *measure* or represent the benefits of whatever kind conferred [*ibid.*, p. 286, OE].

Correct policies were crucial, for on the 'Schemes of Land Distribution and Railway Extension', 'chiefly depend the progress of the wealth of New South Wales and consequently, no doubt, the general improvement and increased happiness of the inhabitants' (*ibid.*, p. 282).

Jevons wrote two more letters to the *Empire* on land policy (24 June 1857) and 'Railway Economy' (29 December 1857) which did not vary the arguments contained in the third letter. Although, in the land policy letter, it was argued that to tax the output of land, rather than its purchase price, was in accord with J. S. Mill's rent theory, and that if that policy was instituted, it would mean increasing employment in the agricultural sector, preventing a 'depression' of wages and business in the towns, 'thus putting a stop to all further clamour about protection'.<sup>17</sup>

<sup>17</sup> A correspondent [W. S. Jevons], 'The Public Lands of New South Wales', *Empire*, 24 June 1857, p. 4.

The third letter (Table 1, Column A, Letter 3) is, therefore, the crucial one. For it contains, in the repetition of Pell's arguments, the basic premises (a) to (e), identified above: pricing by fares and charges measured all benefits and costs to 'the community'; such payments constituted a fair and voluntary exchange—those transactions constituted a 'fair exchange'; such a pricing policy constituted a 'fair and equitable tax'; there should be no (State) 'artificial restraints or stimulants' to commercial transactions since the latter, if unimpeded, would produce the greatest 'happiness' in the society through maximizing wealth.<sup>18</sup> The only point at which Jevons departed from Pell was in the elaboration of the explanation of how adjusting charges would exactly measure costs (thus offsetting benefit with cost) and produce maximum revenue. For Jevons such adjustment would result in reaching a 'point of equilibrium', a point which could be arrived at with 'mathematical exactness'. It might be suggested here that the elaboration resulted from Jevons' earlier mathematical training in England or even from discussions with Pell who was, it should be remembered, Professor of Mathematics at Sydney University.

While Jevons' use of the words 'natural price or exchangeable value' may have derived from a careless reading of Smith's *Wealth of Nations*<sup>19</sup>, Section I(ii) will show it was Whately's *Introductory Lectures* which was the important text at the time the third letter was produced.

<sup>18</sup> In 1879 an article by Jevons advocating 'A State Parcel Post' for England was published in the *Contemporary Review*. According to his scheme most of the work would be undertaken by 'private carriers' on contract—the State's role was basically that of coordinating the system. Jevons acknowledged that, at the time, the railway companies were able to charge 'oppressive' rates for parcel carriage. The blame for that situation, where those companies were able to enforce the 'tax' with 'almost unlimited power', was laid at the door of the 'supineness of the public' (Jevons, 1965, pp. 327n-8n). It is interesting to note here that Jevons' belated acknowledgement that monopoly power *could* lead to 'disequivalent transactions' did not lead to his advocating State intervention on grounds of equality. Rather the argument was couched in terms of efficiency criteria.

<sup>19</sup> Smith's 'natural price' was not a market price—which seems to be the way Jevons was using the term—but rather a long-run position towards which the market price would *tend*. It might be noted here that Pell's arguments on fair taxes could find justification in Smith's

(ii) *The Journal Entries*

On 26 March 1857 Jevons had obtained Whately's *Introductory Lectures On Political Economy*, first published in 1831. The journal comments indicate he had read it by 5 April 1857 and these comments were made a few days before the third letter was published in the *Empire*. It is noteworthy that while, a few months later, Jevons was to describe the *Wealth of Nations* as 'the best work though rather old' and 'perhaps one of the driest' texts (Black, 1973, pp. 292, 322), Whately's was the only political economy text considered important or relevant enough to merit discussion in the journal.

Jevons commented on two of Whately's main arguments, the first being remarkable for its 'truth and beauty':

1st. The exposition of that hidden and seldom noticed principle in the nature of masses of associated men, which leads each to labour on ceaselessly in that very pursuit which will most benefit the whole body through himself seeking all the while his own exclusive advancement is exceedingly interesting and most excellently put. The principle itself, or a closely connected one I had roughly conceived beforehand and expressed under the principle of Individual Competition, and it was my intention to show how a number of men all really and entirely selfish might yet, by means of the advantageous and equitable arrangements which fair and free Competition always ensures work together unconsciously or at least unintentionally each for the good of all. I find this same thing explained by Whately [sic] only from a much higher and more general point of view, and considered to be the result of a *Social instinct*, conferred by God on Man, the system of cooperation, and exchange which civilized society always presents, being a remarkable and very striking because unexpected example of *design* in Providence. I cannot but concur fully in this argument, and I should be glad if I can in time more fully develop and demonstrate the causes mode of operation, and exact effects of Selfish Competition [Black and Konekamp, 1972, pp. 157-8].

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comments that tolls and charges on roads were an equitable mode of tax payment (Smith, 1961, pp. 245-6).

Notice that it is Whately's text which *crystallizes* Jevons' 'principle of Individual Competition' where the economy is conceptualized as a system of 'cooperation and exchange', which reveals the Divine Providential Ordering. Whately identified political economy as the 'Science of *Exchange*' where all exchanges, under the competitive but cooperative process, were an exchange of equivalents (Whately, 1847, pp. 5, 5n, OE).

Yet Jevons disagreed with Whately's explanation of the *mechanism* by which men progressed or 'rose' to various degrees of 'civilization'. He noted this second argument was remarkable for 'its looseness and utter improbability' (Black and Konekamp, 1972, p. 157) and it is his reasons for that castigation which are of interest here. Whately argued that men rose from a '*savage state*' only via the agency of God so that Divine Providence ordained the relative positions of men within a society (particularly the economy) and between different types of societies. On the contrary, Jevons argued, men 'rose' because while 'in their creation' they received the gift of reason from God, subsequently

all have risen to a degree of civilization proportional to their mental capabilities. [It was] unassisted reason [which had] produced all the various conditions of the human race from the Australian aboriginal to the most refined and energetic Anglo Saxon [*ibid.*, p. 159, OE].

Degrees of refinement and social worth were a function of 'mental capabilities' and this claim could be deployed to explain degrees of refinement and social position/worth between and within races.<sup>20</sup>

After hearing a lecture by the Reverend Professor John Woolley, some seven months before the Whately comments, Jevons had explained in the journal where the *impetus* to this progress or refinement of man resided. After hearing Woolley's lecture on 'The Selfish Theory of Morals', Jevons came to a 'satisfactory conclusion' on his own theory of morals:

<sup>20</sup> In July 1856, describing two characters from Bulwer Lytton's *My Novel* (1853), Jevons wrote that 'their characters...[were] so applicable to one in my circumstances. Ambition was the characteristic of each, and knowledge or ability was the instrument to which each principally looked to raise himself in the world...[I] feel inclined to regard *worth* as synonymous with *success*' (Black and Konekamp, 1972, p. 131, OE).

I regard man in reality as essentially selfish, that is as doing everything with a view to gain enjoyments or avoid pain. This self interest is certainly the main-spring of all his actions, and I believe that it is beyond a man's nature to act otherwise . . . In its action on the body the mind must follow a simple and universal law of seeking the most pleasure. [Even] unselfishness [or] benevolence [derived from the prospect of pain or pleasure] [*ibid.*, p. 133]<sup>21</sup>.

This postulation of a crude utilitarian conception of action, coupled with the remarks on Whately, supplement the list of basic premises with regard to the equivalence of voluntary exchanges and the premise of 'Selfish Competition' which maximizes wealth for the good of all, while simultaneously explaining different degrees of 'progress' in societies. The impetus to this 'rising', or 'progress', is explained by the utilitarian theory of action. It can also be noted how the various premises support each other. For if it is to be argued, as Jevons did in the third letter to the *Empire*, that voluntary exchanges, carried out under a regime of 'freedom for commercial transactions', produce maximum 'happiness' (wealth) and that such exchanges are 'fair' (equilibrating pleasure/ advantage and pain/cost), then any exchange must be of equivalents. It was Whately's text which crystallized those arguments<sup>22</sup> which enabled them to be brought together in such a definite formulation as the journal commentary.<sup>23</sup>

<sup>21</sup> While there was no separate political economy course at Sydney University, Professor Woolley apparently dealt with the subject at certain points. In an 1861 exam, students were asked to criticize the definition 'Political Economy is the Science of Social Well-Being'. In 1865-66, 'Professor Woolley's Medal for Bachelor of Arts' was awarded for the best essay on 'The Influence of Political Economy on the Course of History' (Goodwin, 1966, p. 547).

<sup>22</sup> Jevons did depart from Whately's arguments in equating maximization of wealth with happiness in a crude utilitarian fashion. Whately was not a utilitarian and, anyway, as has been explained elsewhere (White, 1979) could not have advanced such arguments at Oxford with any impunity during his Drummond Chair tenure.

<sup>23</sup> There is a further piece of indirect, corroborating evidence suggesting a close relation between Jevons' reading and formulations in the *Empire* letters. This is that it was only after finishing J. S. Mill's *Principles*, Vol. I, that he quoted Mill's rent theory in letter 4—see Table 1.

It has been suggested that Jevons' third newspaper letter, discussed in I(i), provides 'some hints that he was playing with the application of mathematics to political economy' and that the 'influence of Lardner's *Railway Economy*, which he read in 1857, is perhaps evident [in it]' (La Nauze, 1949, pp. 33, 33n).<sup>24</sup> It will now be shown that, apart from the evidence above which reveals Jevons to have repeated Pell's arguments, there is direct evidence that Lardner's text had no role to play in the production of the crucial third Jevons letter.

## II Jevons and Lardner's 'Railway Economy'

The reason why Lardner's text, published in 1850<sup>25</sup>, has been considered the pivotal textual influence on Jevons in the third letter, is not hard to find. For it was Jevons, in the preface to the second edition of the TPE, when discussing how he derived 'the idea of investigating economics mathematically', who claimed that it was 'to Lardner's *Railway Economy* I was probably most indebted'. In Chapter XIII of that text, 'we find the laws of supply and demand treated mathematically and illustrated graphically' (Jevons, 1970, pp. 50, 51). While acknowledging Jevons may have been influenced by Lardner after the third letter, there are sound reasons for arguing that influence was not present in that letter and for treating Jevons' categorization of Lardner's text with a good deal of scepticism.<sup>26</sup>

The first point is that we now know from Jevons' diary entries that he obtained Lardner's text two weeks after the third letter was published and that he did not finish reading it until May 1857 (Konekamp, 1972, p. 27).<sup>27</sup> It therefore seems

<sup>24</sup> See also Hutchison (1966, pp. 35-6); Ekelund (1971-72, p. 180n).

<sup>25</sup> Lardner also had a number of articles on transportation published in the *Edinburgh Review*—October 1832, April 1833, October 1834, April 1837, October 1846. Lardner's authorship was identified in Fetter (1953).

<sup>26</sup> In his eagerness to find 'precursors of the mathematical method' in political economy, Jevons was inclined to overstate his case. For example, in 1879 Foxwell, with Marshall's and Sidgwick's agreement, unsuccessfully tried to dissuade Jevons from listing H. D. McLeod amongst the pre-1871 mathematical economists (Black, 1977b, p. 77).

<sup>27</sup> Since the diary entries relevant for the arguments of this paper are yet to be published (in Vol. VII of Jevons'



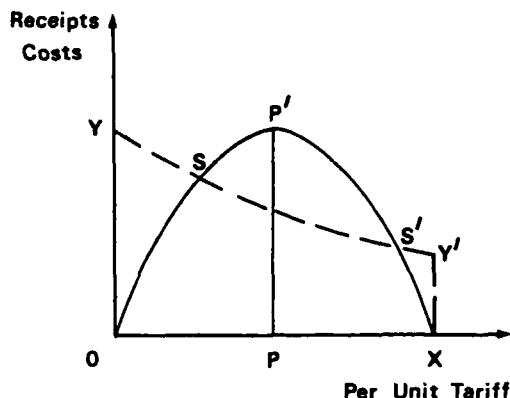


FIGURE 1

Source: Lardner, 1850, p. 249. This diagram is a simplified version of Lardner's.

uncontroversial now to argue that Lardner's text had no part to play in the production of the third letter.

The second point is that Jevons' characterization of the arguments in Lardner's text is highly misleading. Subtitled *A Treatise on the New Art of Transport. Its Management, Prospect and Relations*, Chapter XIII ('Receipts-Tariffs-Profits') was premised on the argument that to obtain the maximum difference between gross receipts and gross expenses was the 'chief financial object to which the vigilance and skills of those who direct the affairs of the railway ought to be directed' (Lardner, 1850, p. 247). Lardner posed the solution to this problem in terms of how the volume of traffic and the average distance it was carried by the railway could be influenced by the price/tariff charged. The argument could be depicted diagrammatically as in Figure 1, where:  $OP'X$  = total receipts;  $YY'$  = total costs; points on  $OX$  show per unit tariff ( $OX > OP$ );  $OX$  is a prohibitory tariff (zero revenue);  $O$  is the zero revenue tariff. Because there are  $XY'$  costs at the prohibitory tariff  $OX$ ,  $YY'$  contains variable and fixed costs, so that at  $OX$ ,  $XY'$  is total fixed costs. (Lardner does not use the words variable and fixed costs, but the distinction is clear in the text's argument.)

The point of maximum profits is not at  $OP'$  (maximum revenue) but somewhere between  $OP'$  and  $OX$  at the point where the rate of decline of receipts equalled the rate of decline of costs. Hence

Lardner's argument that the point of maximum revenue was unlikely to be that of maximum profits.<sup>28</sup> The relationship between the relevant variables could be written symbolically, for example  $P/N = D(r-e) - E'/N$ , where  $P$  = aggregate profits;  $N$  = total tonnage carried;  $D$  = average number of miles each ton carried;  $r$  = average tariff per ton per mile;  $e$  = variable cost per ton per mile;  $E'$  = fixed costs. By manipulating the symbols it was possible, with the aid of statistics, to calculate the point of maximum profit if an average tariff was charged. Various types of carriage could be then identified and Lardner proceeded to specify certain pricing policies in that regard.

While the analysis looks remarkably akin to contemporary introductory microeconomics' analysis of profit maximization for the firm in the short run, with the distinction between fixed and variable costs, Jevons was never to introduce that mode of analysis even in the TPE. Nor in the third (*Empire*) letter did he make a distinction between the points of maximum revenue and profits—dependent on the relation between marginal revenue and marginal cost—a distinction Lardner insisted upon. Moreover Lardner did not provide a theory of supply and demand such as Jevons sketched in the *Empire* letter and even in the TPE. Lardner did not provide a theoretical explanation of supply and demand relationships (it is not even a theory of supply and demand for 'capital') nor did he need to discuss the possibility of an equilibrium point between demand and supply. For Lardner had posed a theoretically distinct problem which was different from that of Jevons: how were profits to be maximized when the railway was in operation and costs and tariffs were taken into account? Jevons and Pell, in contrast, were concerned with the question of whether a railway should actually be constructed and hence they cast the problem in terms of total costs and benefits. This is not, of course, to denigrate Lardner's text in this regard for it is an acute discussion on how railway managements could make profit calculations more precise. But it is to make the point that Jevons' characterization of the text in TPE is erroneous.<sup>29</sup>

<sup>28</sup> Of course, the maximum profit point would not be the maximum revenue point, unless marginal costs were zero. For a more detailed discussion of Chapter XIII of Lardner's text, categorizing it in terms of a monopoly price discrimination analysis à la Pigou, see Hooks (1971). See also Robertson (1951, pp. 240-3).

<sup>29</sup> Jevons was more careful in the first edition of TPE,

*Letters and Correspondence*, I am relying here on Konekamp's (1972) account.

### III The Social Context of the Railway Debates

Given the importance of the railway construction debates for the articulation of the basic premises underlying Jevons' subsequent distribution theory, mention should be made of the social conditions in which the debate took place. A brief examination of those conditions provides the opportunity simultaneously to sketch some biographical information on Pell and provide further evidence as to how closely Jevons followed Pell's outlook and analysis.

It is interesting that Jevons seems to have moved in a similar business-intellectual milieu as he was later to do in Manchester in the 1860s.<sup>30</sup> In Sydney, that milieu was epitomized by membership of the Philosophical Society, but what is more significant is Jevons' support for Pell's arguments in that Society. Pell, whom Jevons knew well enough to obtain a copy of his unpublished critique of Denison, was not simply an academic.<sup>31</sup> In December 1853, 17 months after arriving in Australia, Pell was asked to provide an actuarial valuation for the first distribution of profits by the Australian Mutual Providence Society. In February 1854 he was appointed consulting actuary to that Society and stood unsuccessfully as a director in 1858. His association with AMP ended in 1869 when he became involved with, and subsequently a director of, the Life Assurance Association of Australia, which in 1908 became the Mutual Life and Citizens' Life Assurance Co. Ltd. The LAA broadened the cover of insurance as compared with the AMP, undertaking for example, to make payment even 'if the insured person were killed by an aboriginal native' (Plomley, 1971, p. 75).

noting that Lardner's text discussed the relation between the maximum profit and revenue points. No claim was made for a supply and demand analysis (Hicks, 1934, p. 339n). It should be noted that Pell probably had read Lardner by the time Jevons' third letter appeared. In January 1855 an unsigned article, opposing further railway construction, appeared in the *Sydney University Magazine* ('Anonymous', 1855). The article cited Lardner's text but only to obtain relative railway costs and revenues overseas. It did not cite the argument on the calculations necessary to obtain maximum profits. A textual comparison of the article and Pell's 1856 reply to Denison suggests Pell wrote both.

<sup>30</sup> On Jevons' social activities in Sydney, see Konekamp (1972).

<sup>31</sup> The following paragraph is based on Plomley (1971, Chapter VI); Salier, (1933).

A wealthy man, Pell worked on many government commissions and enquiries in New South Wales. He was a member of the ruling power bloc in that State, a member 'of the highest society in the Colony, whose head was the Governor and whose leaders belonged to the Services, Government, Judiciary and so on' (*ibid.*, p. 78). It is interesting, though, to note the division within the power bloc over railway construction where Pell opposed Denison.

The Sydney Railway Company had been formed in 1848. It was heavily subsidized, and eventually taken over, by the State in 1855—the same year in which the line to Parramatta was opened. In April 1853 'some prominent Newcastle men' argued that a line between Newcastle and Maitland could be profitable as long as it received the same concessions as the SRC.<sup>32</sup> In October of that year, the Hunter River Railway Company was incorporated but it too encountered problems and was also taken over by the State in 1855. The expansion of railway lines was supported by merchants, because they were thought to lower transportation costs and expand trade, and by liberals such as Henry Parkes, for whom railways symbolized a rational and progressive society. By 1854 this liberal group was concerned that leaving railways in private hands would result in the exploitation of a monopoly position, thereby strangling trade. For it was clear that the colony could support but one railroad company and that it could only survive with State assistance. By 1854, when a small group of shareholders held more than 50 per cent of the shares in the SRC, that company had made three applications to the State for loans of public money and a guarantee of the rate of interest on privately subscribed capital. In July of that year, a Legislative Council Select Committee, with Charles Cowper—the SRC President—as its Chairman, supported further railway expansion and suggested that the State take over the SRC and the HRRC. Thus Irving has argued that the demise of the private companies was primarily due to the fear that such companies would exploit their monopolistic position<sup>33</sup>: 'to prevent the decay of *laissez-faire* into a private "monopoly", the

<sup>32</sup> Carroll (1976, p. 40).

<sup>33</sup> The Newcastle-Maitland line opened in 1857. The result of this was that, until the 1880s, New South Wales had two separate railway systems—one radiating from Sydney and the other from Newcastle. For a useful discussion see Wotherspoon (1978).

Cowper liberals allowed the establishment of a government monopoly in railways' (Irving, 1967, p. 482).<sup>34</sup>

Denison allied himself, on the railway question, with the merchants and the liberals. He advocated expanding railway lines 'throughout the country', seeing them—along with telegraph lines—as the symbols 'of our own age'. He was impressed by merchant claims that railways, funded to some extent by rising land prices, would expand trade, open up inland areas and hence 'rescue the country from the sterility to which it is [otherwise] condemned'.<sup>35</sup> Pell, on the other hand, may have represented the views of a commercial-financial fraction of the colony's power bloc which was opposed 'in principle' to 'interference with free commercial transactions' and which held that the correct manner of assessing public projects, like the railways, was to use market criteria, effectively denying wider social effects in the calculations. Those associated with financial institutions, like Pell, may well have been impressed by the realization that increased taxes to fund railways would affect insurance companies which set out to tap the savings of small capitalists and workers. It should also be remembered here that amongst the Sydney 'bankers and professional men', the lowering or removal of the Crown Land minimum upset price was virtually a matter of faith. What was at stake was not so much 'who' owned the land but rather that the owners sought money capital to gain possession and that the land's market value was increased. Thus the capitalization of Crown Lands was the key issue (cf. Dyster, 1978, pp. 3-8).

<sup>34</sup> Two other factors may have been relevant in this decision. First, a lack of support, even apathy, on the part of the squatters towards railways (cf. Irving, 1967, pp. 480-2; Connell and Irving, 1980, pp. 111-12). Second, a lack of money capital. However, this factor does not seem to have been an insurmountable problem, even in late 1854 (cf. Abbott, 1966, p. 45). Another factor may have entered Cowper's calculations—the SRC line was supposed to 'run near . . . various' of his 'country properties' (Dyster, 1978, p. 8).

<sup>35</sup> Denison (1870, pp. 307-8, 443-4, 314-20, 337). In August 1856, Denison complained that 'the engineers' were advocating an expensive expanded railway system completely based on locomotives while members of the parliament wanted cheap railways. Denison's option was for locomotives in the vicinity of Sydney but single line horse-drawn railways in the 'high and difficult country' (*ibid.*, pp. 367-8). In 1857 he read a second and more

The degree of Jevons' alignment with the political position of the bankers, traders and 'professionals' is further indicated in some notes on Sydney which he wrote in 1858. There he argued that a 'great mistake' had been made in the layout of Sydney, as the wrong areas of land had been laid aside for public reserves and parks. One such area was that surrounding Farm Cove, extending to the high ridge of Hyde Park, including Point Macquarie and Lady Macquarie's Chair. That land should have been turned over to trading interests and used for the construction of wharves, while the public land should have been an area between Sydney Cove and Darling Harbour extending to Miller's Point and Dawes Battery. Jevons did note that the latter area was 'steep and to some extent [a] useless and objectionable part' of the Harbour area.<sup>36</sup>

An important corollary of the argument that the key influences in the production of the third letter were the arguments of M. B. Pell and R. Whately, and not D. Lardner, needs to be noted. If Lardner's text is credited with the pivotal influence over the formulation of Jevons' arguments in the *Empire* letter, the picture of Jevons as technician, as 'a-political', 'disinterested' enquirer is enhanced. It lends support to the characterization of Jevons' work on economic theory pre-1862 as the 'approach . . . of a pure scientist' (Black, 1972, p. 125). However, once Whately's overtly political text is given a key role, the question can be posed: to what extent was Jevons aware of the ramifications of the basic premises and the rudimentary premises of his capital theory in relation to a theory of income distribution, before leaving Australia? In other words, to what extent were the 'knowledge' and 'political instrument' functions of his work articulated by 1859? For the analysis of railway

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careful paper for the Philosophical Society, arguing that horse-drawn railways should be adopted 'on all the main lines of communication' (Denison, 1858a). At the same meeting of the Society (18 May 1857), Frederick S. Peppercorn, 'Civil Engineer and Surveyor' of Richmond River, produced a paper with a similar conclusion to Denison's (Peppercorn, 1858).

<sup>36</sup> This part of Jevons' Sydney 'Social Survey' was reprinted as 'Sydney In 1858. A Social Survey', the *Sydney Morning Herald*, 9 November 1929. Captain Ward of the Mint (cf. footnote 1) also opposed further railway construction (Goodwin, 1966, p. 267) although he had been appointed one of the three Railway Commissioners under the provisions of the Railway Act of 1854 (Rowland, 1954, p. 247).

construction costs was not unconnected with the question of income distribution in New South Wales during the 1850s. 'Costs' were often primarily related to wage levels, especially those paid to imported English navvies.<sup>37</sup> In this context, it is perhaps not surprising that Jevons accorded a key role to the question of income distribution during his time in Australia, a point which can now be examined.

#### IV The Jevonian 'Mission'

Whately's *Introductory Lectures* were primarily a discussion of how political economy was an instrument to obtain 'social order'—of how political economy would explain to the 'lower orders' why their economic position was unchangeable and indeed ordained by Divine Providence.<sup>38</sup> His *Easy Lessons* (Whately, 1853) made more clear the specifics of that argument. Given Jevons' praise for Whately in April 1857, it would be surprising if Whately's explanation of the role and function of political economy had no impact on him. It would also be surprising if Jevons' reading of Harriet Martineau's *Illustrations of Political Economy*<sup>39</sup>, with its articulation of the need for 'co-operation' between 'masters and men' and its demonstration of the folly of strikes and class conflict<sup>40</sup>, made no impression on him. For Jevons was to bestow the highest praise on Whately's and Martineau's primers in 1866 when he attacked trade unions in his famous lecture at Owens College, Manchester (Jevons, 1981). In this regard, however, there is no need to rely on supposition. For Jevons was clearly thinking about the role and function of political economy in this area before he left Australia.

In February 1858, in the letter where he described political economy as 'a sort of vague mathematics'<sup>41</sup>, Jevons continued:

I have an idea . . . that my insight into the foundations and nature of the knowledge of man is deeper than that of most men or writers. In fact, I think it is my mission to apply myself to such subjects, and it is my intention to do

so . . . you may feel assured that to extend and perfect the abstract or the detailed and practical knowledge of man and society is perhaps the most useful and necessary work in which anyone can now engage . . . thoroughly to understand the principles of society appears to me now the most cogent business [Black, 1973, p. 292].

Then in the 1859 letter<sup>42</sup>, where Jevons discussed the relation between capital and labour on the one hand and preparation and performance on the other (where 'capital' was made directly analogous to personal sacrifice), he linked the discussion of capital and labour to an article he had apparently (*ibid.*, p. 363) been working on in 1857—with the subject of the 'Division of Labour'—and to his work in the 'Social Sciences':

All the investigations of Social Science must proceed on the assumption that there are causes to make people good and bad, happy and miserable, rich and poor, as well as strong and feeble. It follows that each individual man must be a creature of *cause and effect* [*ibid.*, p. 361, OE].

This search for 'general principles and laws' (*ibid.*), for which political economy was to explain the relation between capital and labour, between rich and poor, required the construction of grand theory. As Jevons noted in 1858, the founding, in England, of the Social Science Association, while 'a great step certainly' in social science investigations, suffered from a disability—'it should not be confined so much to *details and practical suggestions*' (*ibid.*, p. 322, OE).

There was another requirement for the success of the mission, however, which Jevons explained to his sister in November 1857. Revealing his 'inmost thoughts' which he had had when first living in London 'or even before', he wrote of his 'second nature . . . hidden to the world'. That consisted of

One *intention*, viz to be a powerful good in the world . . . that is to be good, not towards one or a dozen, or a hundred but towards a nation or the world, [that] is what now absorbs me. But this assumes the possession of the *power* [*ibid.*, pp. 306, 307, OE].

It should be remembered here that Jevons argued that political economy sanctioned wage cuts in 1866 'for the good of the nation'.<sup>43</sup>

<sup>37</sup> For the case of the Hunter River Railway Company, see Rowe (1980, pp. 28-30).

<sup>38</sup> See White, (1979).

<sup>39</sup> Jevons had apparently read Martineau by June 1857 (Black, 1973, p. 292).

<sup>40</sup> See Routh (1975, pp. 187-97).

<sup>41</sup> cf. footnote 6.

<sup>42</sup> cf. *ibid.*

<sup>43</sup> Jevons (1981); Black (1977, pp. 142-3).

### V Conclusions

While the conventional view has been that Jevons' time in Australia had little significance for the development of his economic theory, this article has shown that the basic premises of TPE were formulated during that period. Moreover, the key influence on Jevons in those formulations was not the work of Dionysius Lardner, but that of Professor M. B. Pell of the University of Sydney.<sup>44</sup> Supplementary influences were provided by Professor Woolley, of the same university, and Richard Whately's *Introductory Lectures*. The Antipodean interlude was also crucial for the articulation of the Jevonian project to derive iron laws of income distribution—a project once again inseparable from the context of Australian policy debates over railway construction and land sales. Finally, this article has provided new information as to how and why the structure and primary details of Jevons' contribution to the 'marginal revolution' were produced.

It can thus be concluded that the basic premises of Jevons' theory of income distribution, conceived as a series of equivalent exchanges, were clearly formulated before he left Australia. In England he proceeded to formulate a detailed and what he regarded as a rigorous theoretical rationale for those premises and correlative arguments, such as those against trade union actions which went beyond the bounds of friendly societies, against trade unions which were anything other than an adjunct to capital. Moreover, fully aware of the political significance of the basic premises, a significance inseparable from their articulation, Jevons, again before leaving Australia, had formulated a role and function for political economy—to explain the iron laws which governed the relations between capital and labour, which determined why people were rich and poor. In 1859 Jevons left Australia. Driven by a mission and ambition<sup>45</sup>, accompanied by a set of basic premises and preliminary theses, he was in search of a detailed theory and a receptive audience.

<sup>44</sup> In discussion during the inaugural Australian History of Economic Thought Conference, Peter Groenewegen noted that the late Ian Parker, formerly of the Reserve Bank, had examined the significance of Professor Pell's political economy. Unfortunately Parker's work apparently no longer exists.

<sup>45</sup> Jevons in April 1863: 'I must begin life again and by another way, ingratiating myself where [and] when I can ...' (Black and Konekamp, 1972, p. 191).

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