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THE PROBABLE EFFECTS OF AN EIGHT HOURS DAY ON THE PRODUCTION OF COAL AND THE WAGES OF MINERS

WILL the introduction of an eight hours day for miners reduce the output of coal? Will it also reduce wages? These two points I propose to examine apart altogether from the particular method adopted for securing the limitation of hours. Too much attention has been given to the relative merits of an eight hours day imposed by the legislature and an eight hours day obtained by concession. The amount of coal a man can hew in a given time is entirely independent of the process by which such time is fixed, and the wages of a miner under an eight hours day will be the same whether the eight hours be a legal or a voluntary limit.

At the conference held in the early part of this year between the representatives of the coal-owners and of the Miners' Federation, the miners expressed the view that, if an eight hours day were conceded, they had no fear 'that there would be any diminution of the output.' To this statement the coal-owners replied: 'It is impossible to understand upon what ground this statement rests. The usual practice in the midland counties, Lancashire and Cheshire, and North and South Wales, is to work a single shift. It is also the custom to wind coal from eight to ten hours. If every person employed underground is to be drawn out within eight hours of the time he goes down it is manifest that coal winding cannot be carried on for more than six and a half to seven hours, and in many instances even less than that, as

No. 2.—VOL. I

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at nearly all the large pits it occupies from one hour to two to lower and raise the men employed. The result of a six and a half to seven hours winding day would be to reduce the output of coal from 20 to 25 per cent., and, as a very large number of all the persons employed underground are paid by the piece, this would very largely reduce the aggregate wages-fund, and consequently every pieceman would suffer in proportion. Another very serious result would be a large increase in the cost of production. This lessened production and increased cost would lead to a very considerable advance in the prices of fuel of all descriptions.'

The coal-owners do not refer to the facts on which these conclusions are based, and in view of the undeniable circumstance that the hours of labour have in past years been largely reduced without either the output of coal, the price of coal, or the wages of miners being adversely affected, the conclusions cannot be accepted without careful examination.

The specific proposal placed before the coal-owners on behalf of the miners was worded as follows :—' That it be a special rule in every mining inspector's district that no person should work underground from bank to bank more than eight hours in any one day of twenty-four hours, and that the same should be mutually agreed upon and form part of the Act of 1887.' In speaking of an eight hours day I propose to assume that it is equivalent to a maximum of forty-eight hours per week. For many reasons it is more desirable to examine the effects of a reduction in hours from the point of view of the week than of the day. Indeed the mere number of hours a man works is no clue to his output, unless it is known how many days in the week or year he is working. The official returns do not go beyond giving the average number of hours and of days per week obtaining in each district.

Three returns have been published relating to the hours of labour in mines : (1) The return prepared by the Home Office for the House of Commons¹; (2) the return showing the average number of hours worked in a week's work in the chief trade centres, prepared by the Board of Trade²; and (3) the statement of the hours worked in coal mines, prepared by the Miners' Federation, printed as an appendix to the last-mentioned return.

The second return was prepared from the answers given in reply to 133 circulars, but the figures are given so generally that, beyond showing that there has been a substantial reduction in hours since 1850, they are of little use for our purpose. The

¹ Mines (Hours of Labour), 1890, No. 284.

² Trades (Hours of Work), 1890, No. 375.

statement of the Miners' Federation is very valuable as regards specific information inasmuch as it gives particulars for each mine separately. Unfortunately all reference to the length of the working week is omitted, and no attempt has been made to arrive at averages for each district. The return of the Home Office is well arranged, the averages being given for each district and for each class of men. The value of the return would have been greatly increased had it stated on what principle the averages were calculated. A true average is as useful as a false one is misleading. A little consideration will show that in calculating the average hours in a district it is necessary to have regard not merely to the variation of hours but to the number of men employed. If 10,000 men are employed for nine hours in one colliery and 1000 men in another colliery for ten hours, it would be very misleading to say that the average length of the day in the two collieries is nine and a half hours. The 11,000 men work 100,000 hours in the day, which gives an average of 9·09 hours for each man. I propose to assume that the averages in this return are true averages. In the following Table A will be found a statement of the number of hours worked in each coal district, of the number of hours worked per week, and of the number of hours miners would work per week under an eight hours day assuming them to work the same number of days as they do at the present time. This table is based on the return of the Home Office on the Hours of Labour in Mines.¹ From this table it will be seen that in Northumberland, Durham, South Staffordshire and Worcestershire, no change would occur in the hours of hewers. In the other districts the weekly hours would be reduced as much as six and a half hours in Lancashire, and as little as ·3 of an hour in Argyll. Restricting our attention to the more important coal-fields, it appears that (col. 6) there would be a weekly reduction of seven hours in Nottinghamshire and Lancashire, nearly seven hours in South Wales, six and a half hours in Lancashire, and four hours in Yorkshire. These are very substantial reductions, but they are based on the supposition that after the shorter day is introduced the same time as now will be taken for meals, and that the miners will only work the same average number of days per week. But in those districts where eight hours is already the rule but little or no break occurs for meals. In the seventh column will be found the average times now taken for meals, and it will be seen that in many districts the saving of the meal time will more than compensate for the reduction in hours ;

¹ Since the table was published the hewers in Durham, Northumberland, and some parts of Lancashire have obtained a further reduction in hours.

and that excepting Leicestershire and Nottinghamshire there are only four districts where the reduction in hours would amount to two hours per week. In the two counties mentioned the reduc-

TABLE A.

Table showing the reduction of the hours of hewers that would take place per week if the hours were reduced to eight from bank to bank and the same number of days were worked as at the present time.

1	2	3 Number of hewers.	4 Hours worked per week.	5 Hours per week under 8 hours' day.	6 Reduction in hours per week.	7 Hours per week off for meals.	8 Reduction in hours per week if no time taken for meals.
E.S.	Clackmannan	591	47·3	44	3·3	5·6	Nil
	Edinburgh	2,703	47·9	44	3·9	3·7	Nil
	Fife, Kinross, and Perth	5,170	46·9	44	2·9	3·3	Nil
	Haddington	596	38·7	34	4·7	3·6	1·1
	Lanark, pt. of	11,662	51	44	7	5·1	1·9
	Linlithgow	2,598	49·5	44	5·2	4·6	·6
	Stirling, pt. of	2,228	44·1	40	4·1	5·5	Nil
W.S.	Ayrshire	7,499	48·1	41·6	6·5	5·1	1·4
	Stirling, pt. of	845	47·8	43·4	4·4	4·8	Nil
	Lanark, pt. of	8,011	46·3	39·4	6·9	4·5	2·4
	Dumbarton	792	45·9	41·3	4·6	4·4	·2
	Renfrew	532	49·3	42·4	6·9	5·0	1·9
	Argyle & Dumfries ..	205	46·4	46·1	·3	5·77	Nil
	Cumberland	5,885	46·5	44·8	1·7	2·8	Nil
Y.	Yorkshire	34,742	44·0	40	4·0	3·6	·4
M.	Lancashire, N. & E.	18,557	47·8	41·3	6·5	3·8	2·7
L.	„ W.	15,744	45·0	38·6	6·4	4·6	1·8
M.	Derbyshire	17,470	47·4	40·8	6·6	2·4	2·2
	Leicestershire	2,448	46·6	38·9	7·7	2·5	5·2
	Nottinghamshire ..	10,159	47·3	39·4	7·9	2·5	5·4
	Warwickshire	2,117	46·7	44	2·7	2·8	Nil
	Cheshire	1,171	45·4	40·1	5·3	2·7	2·6
N.S.	Shropshire	2,083	42·3	39·9	2·4	3·3	Nil
	Staffordshire, N. ...	8,467	46·7	41·7	5	3·2	1·8
S.W.	Brecon	13,453	51·7	44·8	6·9	—(a)	
	Glamorgan						
	Monmouth						
	Somerset	1,582	49·2	47·5	2·7	—(a)	
S. Wal.	Gloucester	3,317	47·0	43·2	3·8	—(a)	
	Brecon	403	50·8	44·8	6·0	3·7	2·3
	Carmarthen	1,017	52·2	46·4	5·8	4·9	·9
No change would occur in the following districts:—							
N.	Northumberland ..	11,840	37·1	—	—	—	2·6
	Durham, pt. of	8,545	39·4	—	—	—	2·7
	Durham	24,178	40·3	—	—	—	2·5
	Westmoreland & N.R. Yorks ... }						
S.S.	Staffordshire, S. ...	9,752	40·8	—	—	—	4·3
	Worcestershire	1,393	40·8	—	—	—	4·3

(a) No return given.

tion would amount to over five hours per week, but if the miners were to work five extra hours they would not then exceed

forty-four hours per week. In short, if the hewers were to surrender their meal time, they could work an eight hours day from bank to bank, and work at the face as many hours as they do at the present time and in no case exceed from thirty-five to forty-four hours per week.

The return is silent as to the hours allowed for meals in the South Wales district. Mr. Abraham, M.P., informs me that in Breconshire, Glamorganshire and Monmouthshire, the average time allowed for meals in a week varies from two to three hours; the daily time varying from twenty to thirty minutes. Taking the average time at two and a half hours, the introduction of an eight hours day would in these counties, even though no time were taken for meals, involve a reduction of rather over four hours per week. But it will be seen from the above table that the total number of hours per week under an eight hours day, the miners working the same average number of days as at present, would be 44·8. By working four hours additional the number would be just over forty-eight hours. It follows that in South Wales the hewers, by working forty-eight hours per week and by saving the time allowed for meals, would be able to be engaged at the face almost as long as they are at the present time.

If we turn from the hewers to the other underground workers, we find that they fall into two classes, first men and boys engaged in conveying minerals from the face to the pit bottom, and secondly other underground workers whose services are essential to the working of the mine. The return on the Hours of Labour shows that the greatest diversity exists in their hours as compared with the hours of hewers. In Yorkshire, North and East Lancashire, Leicestershire, Nottinghamshire, part of Breconshire, Carmarthenshire, Pembrokeshire, there is no practical difference between their hours and the hours of hewers, but in the other coal districts their hours are longer. In the case of Durham and Northumberland the explanation of the longer hours is to be found in the fact that three shifts of hewers are used to two shifts of other underground workers, but even in these counties the underground workers not engaged in bringing minerals from the face to the pit bottom work at the present time only an eight hours day.

The following table¹ shows the average hours worked per week by both classes of underground workers, the average weekly time allowed for meals, and the average actual hours at work excluding meal time.

¹ See p. 246.

From this table it appears that the only districts where the

TABLE B.

Table showing number of hours worked by underground workers other than hewers, based on the Return of the Home Office.

District.	Men and boys conveying minerals from the face to the pit bottom.	Average No. of hours per week.	Average number of hours per week for meals.	Average weekly hours actually at work.	Other underground workers.	Average number of hours worked per week.	Average number of hours per week for meals.	Average weekly hours actually at work.
Clackmannan	187	45.1	5.1	40	194	51.1	5.3	45.8
Edinburgh	988	49.2	4.0	45.2	608	47.9	4.0	43.9
Fife, Kinross, & Perth.	1,380	47.5	3.1	44.4	1,124	47.0	3.1	43.9
Haddington	153	39.2	3.1	36.1	80	40.7	3.6	36.1
Lanark, pt. of	3,668	52.3	5.3	37.0	1,644	56.1	5.5	50.6
Linlithgow	938	49.6	4.6	45.0	504	55.4	4.9	50.5
Stirling, pt. of	700	45.4	6.0	39.4	235	56.7	6.2	50.5
Ayrshire	1,078	49.0	4.9	44.1	1,178	50.0	4.9	45.1
Stirling, pt. of	369	50.5	4.5	46.0	233	51.6	4.9	46.7
Lanark, pt. of	2,331	46.1	4.6	41.5	1,802	51.5	4.8	46.7
Dumbarton	358	47.5	5.1	42.4	266	49.6	4.5	44.1
Renfrew	243	47.9	5.0	42.9	161	54.8	5.5	49.3
Argyle & Dumfries....	29	52.4	10.6	41.8	46	52.1	11.0	41.1
Newcastle	4,745	54.1	2.6	51.5	6,481	45.9	2.8	43.1
Durham, pt. of	4,909	57.3	4.1	53.2	4,858	44.4	2.7	41.7
Durham	12,920	59.0	4.7	54.3	10,767	48.1	4.6	43.5
Westmoreland								
Yorks, N.R.	13,442	45.3	4.0	41.3	8,190	43.5	4.1	39.4
Yorkshire								
Lancashire, N. & E. ..	5,053	47.8	5.1	42.7	4,479	47.8	5.1	42.7
" W.	5,730	49.5	5.0	44.5	6,330	48.1	5.0	43.0
Denbighshire	1,194	46.8	3.3	43.5	936	46.8	3.1	43.7
Flintshire	462	51.6	3.6	48.0	288	51.6	3.9	47.7
Derbyshire	5,393	47.9	2.4	45.5	2,815	49.0	2.7	46.3
Leicestershire	741	47.9	2.5	45.4	538	47.2	2.5	44.7
Nottinghamshire	2,569	46.2	2.4	43.8	2,189	48.0	2.5	45.5
Warwickshire	1,328	50.4	3.7	46.7	538	50.2	3.9	46.3
Cheshire	486	50.3	2.7	47.6	121	48.8	3.2	45.6
Shropshire	498	45.8	3.5	43.3	159	48.6	3.6	45.0
Staffordshire, N.	3,859	48.8	3.3	43.5	2,112	49.8	3.4	46.4
" S.	3,857	45.2	4.1	41.1	2,245	45.3	4.3	41.0
Worcestershire	550	45.2	4.1	41.1	320	45.3	4.3	41.0
Breconshire, pt. of ..	2,634	54.4	(a)	..	3,541	53.4	(a)	..
Glamorganshire								
Monmouthshire	1,382	54.0	(a)	..	789	60.8	(a)	..
Somersetshire								
Gloucestershire	911	49.5	(a)	..	1,092	49.2	(a)	..
Breconshire, pt. of	41	52.2	5.8	46.4	15	51.3	none	51.3
Cardiganshire	296	49.4	8.1	41.3	203	52.2	5.6	46.6
Glamorganshire	8,253	51.4	3.7	47.7	14,086	51.5	3.7	47.8
Pembroke	172	52.5	2.9	49.6	52	51.7	2.9	48.8

(a) The time allowed for meals is not stated in the Return, but Mr. Abraham estimates the weekly meal time at from two to three hours.

hours apart from meal time of underground workers exceed at the present time forty-eight hours per week are given on the next page.

It is apparent that a very small portion of the mining popula-

tion outside South Wales, Durham, and Northumberland, whether hewers or other underground men, are actually engaged in work over forty-eight hours in the week.

	Number of Workers.	Hours.
Lanark, pt. of	1,644	50·6
Linlithgow	504	50·5
Stirling, pt. of	235	50·5
Renfrew	161	49·3
Newcastle	4,745	51·5
Durham	4,909	53·2
"	12,920	54·3
Brecon	15	51·3
Pembroke	172	49·6
	52	48·8

In South Wales, however, the longest hours of underground men are 54·4. The time allowed for meals, as pointed out above, is about two and a half hours; so that a forty-eight hours week would mean a reduction of four hours even if meal time were saved.

The counties of Durham and Northumberland have always enjoyed a special reputation in the coal industry. But whilst hewers work shorter hours there than elsewhere, the boys and men who are engaged in bringing the minerals from the face to the bottom of the pit work from ten to eleven hours per day. The system appears to be due to the fact that the hewers have used their influence to shorten their own hours, but not the hours of the boys. Three shifts of hewers are utilized to two shifts of boys. The introduction of an eight hours day in these counties would require the employment of a larger number of boys in order to maintain the output.

In discussing the effects of the reduction in hours on the output but little assistance is gained from economic theory. It may be admitted that, if every factor that relates to the production of coal were to remain constant, a reduction of hours will reduce the output and raise the price. If this occurs, every industry and every household that uses coal will be affected, and the demand for English coal both at home and abroad may decrease. It would be interesting to trace all the various economic results that might possibly ensue, but where the theoretic economist ends the practical legislator begins; and I prefer, on the present occasion, to try and ascertain if any forces are in actual opera-

tion, or are likely to come into operation, that will probably neutralize the theoretical conclusion that a reduction in hours will reduce the output.

The reduction in the hours of miners during the last fifty years has been very great, and, though it has occurred during a period in which many legislative restrictions have been placed on mines, yet the production of coal has steadily increased. In 1854 the output was sixty-four million tons; in 1889 it was one hundred and seventy-six million tons. It is quite evident from these figures that any tendency towards a decrease of the output arising from the action of the legislature or the reduction in hours has been altogether counterbalanced by other forces tending to increase the output. There is no reason to suppose that the operation of these forces has come to an end.

The reduction that has already taken place in the hours of labour in mines may be gathered from a comparison of the Return of the Home Office with the Report of the Royal Commission of 1842 appointed to inquire into the employment of women and children in mines. The hours of women and children were the same as those of men. Fifteen hours a day was common in Scotland and in Cumberland; fourteen hours were worked in Derbyshire and some parts of Yorkshire. Twelve hours were the rule in other parts of England. The Home Office gives the hours of hewers for 1890 as varying from thirty-seven to fifty-two per week, showing a very large decrease.

The total output of coal depends on many circumstances. If mathematical language may be used, it may be said that the output is a function of many variables, of which the number of hours worked per man is only one. These circumstances or "variables" fall into two classes: (1) those tending to increase the output of a particular mine, and (2) those tending to develop new coal-fields.

Looking at the former class, the first point to notice is that a reduction in hours tends to increase the efficiency of the miner. The table on the next page, compiled from the Mineral Statistics for 1887, gives the output per man for the leading coal districts.

It appears from this table that in South Staffordshire and Durham, where less than eight hours per day are worked by the hewers, the output per hewer is higher than in any other coal-field. It is true that in Durham double shifts are worked, and the underground men who are not hewers remain more than eight hours in the mine; but in South Staffordshire only one

shift is worked, men and boys working the same number of hours. Northumberland is the only other district where the hewers enjoy less than an eight hours day; the small average output in that county is due to the special hardness of, and the difficulty in working, the coal. It is said that in Durham and Northumberland the hewer works with much greater vigour than he does in any other district, with the object of hewing as great a quantity of coal as possible in his working day. The hewer's wages depend on (a) the price of coal, and (b) the quantity he hews. The more he can hew whilst he is at work the greater his wages. Apart from the question of wages, it is a well-known fact that, when physical exertion is necessary, the longer the day the slower the

	Output in tons.	Number of underground workers.	Number of surface-men.	Total.	Output per underground worker.	Output per underground and over-ground worker.
Staffordshire, S.	8,173,901	14,502	4,875	19,377	563	422
Durham, N.	7,854,492	16,036	4,427	20,463	490	383
Durham, S.	21,003,629	44,031	11,414	55,445	499	379
Scotland, E.	15,268,186	35,419	6,777	42,196	431	364
Lancashire, W.	10,981,491	27,708	6,179	33,887	396	324
Scotland, W. ...	6,216,790	15,939	2,929	18,868	396	320
Derbyshire	9,063,407	23,512	6,225	29,737	385	304
Lancashire, N. and E.)	9,786,927	26,141	5,325	31,466	374	311
Yorkshire, E. and W.)	20,104,713	54,040	12,864	66,904	372	300
Glamorganshire	17,791,298	51,249	8,532	59,781	347	297
Northumberland	5,658,940	21,289	4,416	25,705	265	221
Total for whole country. ...)	162,119,812	428,540	97,737	526,277	378	308

worker. To ascertain the exact number of hours that a healthy man can work with the greatest possible advantage in the production of wealth—the effects of the toil on his physical frame being taken into account—would be a difficult though not impossible task. But the Durham miner may be taken as a proof that shorter hours of labour do not necessarily diminish production

Not less important than the efficiency of the miner is the efficiency of the machinery available for bringing coal from the face to the surface. The effect of improvements in this respect may be illustrated by the fact communicated to me that in Lancashire one of the largest colliery proprietors in 1852 was only able to wind 600 tons per day from twelve pits, whereas now he can wind

the same quantity in one day from a single pit. It is in winding rather than in coal-cutting that the chief advances have been made in the application of machinery to mines. Coal-cutting machines are not used to any large extent. The moving of machines from one seam to another, and the supply of motive power, raise difficulties that cannot always be overcome. Apart from this, a coal-cutting machine is useful not so much for increasing the quantity produced as for cutting the coal so as to be more merchantable than coal picked by the miner.¹

The average number of hours the hewers are at the face, and the average number of hours the winding machinery is in motion, in the leading coal districts, are as follows :—

	Average number of hours worked at face.	Average number of hours coal is drawn to surface.
Northumberland	6·07	4·50
Durham	5·87	5·30
Staffordshire, S.....	7·32	7·6
Yorkshire	7·5	3 to 5·25
Lancashire, W.	7·86	9·5
„ N. and E.	8·0	8
S. Wales	7·66	9·0

It will be noticed from this table that in the three first-mentioned districts, where the miners work the shortest hours and yet hew the largest amount per man, the winding machinery and the methods of bringing coal to the surface are superior to those found in other districts. In the northern counties and in Staffordshire the coal can be brought to the surface in a shorter time than it takes to hew it ; in the other districts it requires a longer time. The distance of the face from the surface is not sufficient to explain these differences, as appears from an examination of the returns issued by the Miners' Federation.² One is forced to conclude that the appliances and methods used for hauling coal in many coal-fields are open to improvement.

A third force that cannot be overlooked is the power possessed by the mines at present open of increasing their production. The mineral statistics for 1890 show that in 1889 nearly seven million more tons of coal were raised than in the year previous. Doubtless some part of this increase is due to the re-opening of

¹ Report of Select Committee on Coal, 1873 ; Q. 1978, 2198, 2829, 7582.

² See Appendix to Trades (Hours of Labour), 1890, 375.

old mines and the employment of additional hands ; but, as considerable time is required to sink a shaft and start a new mine, it is not probable that any large part of the increase arises from the development of new fields. During the coal famine of 1873 the high wages paid and the large profits realized induced the lessees to send down into the mines a considerable number of those engaged on the surface : in other words, the number of surface men was decreased, and the number of hewers increased. The same process may have been going on during the last twelve months, and the miners may have been working for a greater number of days in the year. But, whatever be the cause, it is clear that there is no difficulty under the stimulus of higher prices of increasing the production of coal in a single year by seven millions of tons, or over four per cent.

That industrial pressure leads to increased efficiency in production is a principle constantly exemplified, but often overlooked. It is true that many of the inventions that have benefited the race can be traced to a happy discovery or to a series of laborious experiments ; but, on the other hand, many discoveries and inventions are due solely to necessity. The lead taken by the United States in the construction of labour-saving appliances is due mainly to the disadvantage the producer is under owing to the scarcity of labour. The depressed state of the cotton industry has resulted in so many improvements that the worker is now able to gain a higher weekly wage than he formerly did in prosperous times. It can no longer be assumed that an interference of the legislature with industry will increase the cost of production. The coal trade is a singular instance of this. No industry is surrounded with a greater number of legal checks, yet these checks have only paved the way for economies that leave the cost of production practically where it was before.

If we turn from the causes affecting the productiveness of the mines open at the present time to consider the causes tending to the development of new coal-fields, it is evident that they are by no means exhausted. Apart from the clauses and stipulations usually inserted in mining leases, the leading factor in the development of a coal-field is a ready access to markets. It might be thought that there was no room for any further development of means of communication in England, but at the present time not less than three important schemes are on foot that have for their object, amongst other things, the cheaper transit of coal to the consumer. The projected line through Derbyshire to

London, promoted by the Manchester, Sheffield, and Lincolnshire Railway, will, it is calculated, tend to double the production of coal in Derbyshire, Nottinghamshire, and part of Yorkshire.¹

One of the main objects of the proposed east and west coast line is to give an outlet on the west coast to the inland coal districts. Mr. Arnold Lupton, of the Yorkshire College, in his evidence given before the Committee of the House of Lords on the Ship Canal, pointed out that Yorkshire steam coal could not at the present time compete with Welsh coal, owing to the cost of carriage to Liverpool. He estimated that at Manchester the coal could be put on board vessels in the Ship Canal at a price that would at once secure a market.² Other witnesses gave similar evidence.³ It may of course be urged that the above increase in transit facilities and the consequent development of new coal-fields are entirely independent of any reduction in hours. This may be admitted. But the fact is all-important in discussing the probability of a reduction in hours reducing production and raising the price of coal. Assuming the demand to be unchanged, the increased output from the new coal-fields will tend to neutralize any reduction due to decreased hours. It may be said, however, that if hours are not reduced, the extra-production of new fields will cheapen coal, and therefore the consumer will gain more benefit than if hours were not reduced. But on the other hand the lower price of coal may prove unremunerative to the producer, and he may at once contract the supply by working his mines fewer days in the week. So that a reduction of hours might be brought about owing to the opening of the new coal-fields. Price always tends to affect supply, and any rise in price due to the shortening of the hours of labour tends to lead to an increase in the supply. In 1871 the price of steam coal f.o.b. at Cardiff was 10s. 6d.; in 1872, 15s.; and the supply rapidly increased. In 1873 the price was 23s., in 1873 and in 1874 16s. 6d.; whilst in 1876 it was 10s. 3d. This great fall was due partly to the falling off in the demand and partly to the great increase in the production of coal. The high prices of 1890 have also led to an increase in the supply, with the result that with a slight falling off in the demand prices are tending to fall rapidly. Prices in the coal trade usually fall and rise rapidly. One explanation of this circumstance is that

¹ See evidence of Mr. H. D. Pochin before the Select Committee of the House of Commons.

² See evidence before Committee of 1883, Q. 5530.

³ See evidence before Committee of 1885, Q. 9041, 10,412, 10,448.

many ironmasters are lessees of mines. When the iron trade is depressed, the coal which in good times is used for the manufacture of iron is thrown on the market and prices rapidly fall ; but as soon as the ironmaster feels the influence of high prices the coal is taken off the market and prices rapidly rise.

From the point of view of wages, workers in and about mines fall into two classes: (1) those paid by the piece, and (2) those paid by the day. The hewer is the type of the former class. As a rule he is paid by the number of tons he sends to the surface. Other underground men and surface men are paid by the day, mainly because the product of their labour is not capable of actual measurement. But it may be laid down as a general principle, at least in mines, that day wages follow piece wages. A rise in the wages of hewers is usually accompanied by a rise in the wages of day workers. For instance, the sliding scales formerly in use in Durham provided for a rise and fall in the wages of enginemen, mechanics, and banksmen, as well as the wages of hewers. We may therefore take the wages of hewers as typical of wages in coal mining. Under the sliding scale system the tonnage rate of wages rises and falls with prices. But even where no scale is in operation wages follow prices. It is true that sometimes attempts are made to increase wages and to increase prices, but the force of competition prevents any artificial price being maintained. Only a monopolist can control prices, and even he is limited by the views of the consumer. During the years of the coal famine wages rose as prices increased, and fell as prices decreased.

The individual miner has but little control over prices. He may diminish or increase his own output, but he can obtain no guarantee that new pits will not be opened or that diminished production will not affect foreign markets. Concerted action on the part of the majority of miners would undoubtedly affect the production and the price of coal, but any large rise in prices at once sets in motion forces that tend to bring about a fall.

If, as I have argued, a reduction in the hours of labour will not eventually affect the output, it follows that it will not raise the price of coal. The miner cannot therefore expect any increase in his tonnage rate. Before the tonnage rate rises prices must rise ; the production remaining the same prices remain as they were before.

Nor can the miner have any guarantee that prices will be

maintained. He may to some slight extent affect the supply, but otherwise he is powerless to control the forces that regulate the demand. A reduction in prices tends to reduce the rate of wages.

And in so far as any miner working a forty-eight hours week sends to the surface a smaller amount of coal than he does at present his weekly wages will fall. From the table previously referred to it appears that in all the districts it is possible for a maximum eight hours day to be worked without reducing the actual number of hours per week that the men work at the face. For instance, in West Lancashire the hewers are underground forty-five hours per week of 4·83 days, and of this time 4·6 hours are devoted to meals. Under a maximum eight hours day, if they work only the same number of days, *i.e.* 4·83, they would be in the mine 38·6 hours. It is not to be supposed that a miner in 38·6 hours can hew as much as in forty-five hours. His weekly wages will tend to be reduced in proportion to the reduction of hours. But such reduction will tend to make him work a sufficient time to secure his former weekly wages. Will he be able to do so under an eight hours day? Undoubtedly. Out of the forty-five hours previous to the reduction 4·6 hours were devoted to meals, leaving only 40·4 for getting to and from the face and hewing. If after the introduction of the eight hours day the hewer saves the 4·6 hours, he will be able to devote the whole 38·6 hours to his work, leaving only 1·8 hours to be worked additional on the fifth day. To put the matter shortly, 40·4 hours (the average number of weekly hours the West Lancashire miners work at present, meal time being excluded) could be worked under an eight hours day in 5·05 days, no time being allowed for meals. The hewer who is underground at present for 4·83 days in the week and is allowed 4·6 hours per week for meals, would be underground 5·05 days, and receive no time for meals. The figures given in column 7 of Table A show clearly the possibility of most miners hewing as many hours under an eight hours day as under the present system.

Will the possibility be realized? Will the miner be ready and willing under an eight hours day to endeavour to maintain his output? Whatever answer may be given to this question, there is no doubt but the miner will have every incentive to hew as much coal as possible. The miner's 'standard of comfort' varies, it is true, in different parts of the country; but that he aims at some standard is beyond all doubt. Prices not rising, he must, to gain the same wages in the shorter day, send as much

coal to the surface as he did before, and hence he will have the strongest possible motive to save time from the hours allowed for meals, to use a faster stroke, to idle less, and even to increase if necessary the average number of days he works in the week in order to realize his standard.

It has been said that high prices and the consequent high wages generally result in miners decreasing their output. I have given more than one reason tending to show that any rise in prices owing to a reduction in hours is likely to be very temporary. But the fact, if it be true, that when wages reach a certain point miners reduce their output, would certainly tend to raise prices still higher. Owing to the recent rise in the price of coal the miners in Durham and Northumberland have, it is said, reduced the number of hours they work per week. The only detailed evidence on the point that I have been able to find is that contained in the Report of the Select Committee of the House of Commons, 1873. It appears that the miners in Durham and Northumberland in 1872 reduced their hours of working. 'In our collieries,' said Sir Isaac Lothian Bell, 'where in 1870 hewers earned 4s. 7½*d.* per day, and to do that had to work, or rather had to be absent from daylight from the pit head, about ten hours, now the same man can earn 7s. 5*d.* a day in eight hours. At the same time he has reduced his quantity from four and a half to three and a half tons, and, unless the colliery workings had been extended, that would have represented a falling off in the output, but we have gone on extending as fast as we could to supply our own works and to supply markets.'¹ Similar evidence was given by other witnesses as to Lancashire² though the miners' agent refused to admit that there had been any reduction in the output.³ Unfortunately the statistics furnished to the inspectors of mines previous to the enactment of the Mines Regulation Act as to the output per man are practically useless, inasmuch as it was not compulsory on mine-owners to make returns. The inspectors, who were examined before the Committee, were careful to point out that, though the figures for the year 1872 showed a substantial reduction in the output per man, the figures by themselves were misleading, inasmuch as the compulsory returns for 1872 were much more accurate than the voluntary returns for previous years. The figures given in the Report of the Committee represent that the average output in 1871 was 321 tons; in 1872, 299 tons per worker as compared with 317 tons per worker in the year 1870. 'On the whole the diminution in the yield per man employed in getting

¹ Q. 6163.

² Q. 1991, 2104.

³ Q. 4109.

coal since 1871 is not much less than that shown by the table.' Outside Northumberland, Durham and Lancashire, the evidence tended to show that the increase in prices and wages did not affect the output of the hewers. In South Wales,¹ Yorkshire,² Derby, Nottinghamshire, Leicestershire and Worcestershire,³ or West Scotland,⁴ the hours were not reduced, whilst in South Staffordshire, East Worcestershire, North Staffordshire, Shropshire, and Cheshire, the output per hewer was increased.

If the hours of labour in these last mentioned districts are compared with the hours of labour prevalent in Durham, Northumberland, and Lancashire for the years 1871 and 1872, the cause of the reduction of the output per man is evident. In these last mentioned counties the working week previous to the rise in prices and wages was apparently longer than in other parts of England, and the colliers utilized the rise in prices to secure either a shorter working day or else a shorter working week or fortnight. The result was that an eight hours day was prevalent in England during the year 1872.

The choice between money and leisure presents itself to the collier as it does to every one who has to earn a living. Prosperity makes some men work harder, whilst to others it brings an opportunity for rest. The Durham hewer prefers, when wages reach a certain point, to reduce his toil; the Welshman in higher wages sees an opportunity of increasing his income. But whether the high prices bring in their train more wages or greater leisure, the total output of coal steadily increases under the influence of forces that the additional leisure may slightly modify but cannot control.

It remains to draw attention to the experience that England has already had of an eight hours day. The great rise in the price of coal that occurred in the years 1872 and 1873 resulted not merely in an increase in wages, but in a reduction of the hours of labour. The Report of the Select Committee of the House of Commons appointed to inquire into 'the causes of the present dearness and scarcity of coal'⁵ contains valuable evidence on the effect of a reduction of hours on production. Unfortunately, as I have pointed out, the statistics relating to the production of coal per man previous to the year 1872 have to be used with the greatest care, as the Coal Mines Regulation

¹ Q. 1519.² Q. 692.³ Q. 856.⁴ Q. 1730-1741.⁵ No. 313, 1873.

Act, which makes it compulsory on mine-owners to supply returns relating to the output and the number of persons employed, was not then in force. The great increase shown in the number of persons employed in the year 1872 is ascribed by the Inspectors of Mines partly to the more accurate returns received.¹

In Northumberland, North Durham, and Cumberland the days and hours of working were reduced from five days of six hours to four and three-quarter days of six hours;² in South Durham from four and a half days of eight hours to four and a half days of six hours;³ in the Midlands from sixty to forty-eight hours per week;⁴ and in South Staffordshire from four and a half days of eleven hours to four and a half days of eight hours.⁵

In Yorkshire, South Wales, and North Staffordshire no change occurred, but in the majority of districts either the average number of days worked per week, or the average number of hours worked per day, was reduced, with the result that a maximum eight hours day was universal over the whole country. One cause of this reduction of hours was undoubtedly the limitations placed on the employment of boys by the Coal Mines Regulation Act. That Act practically established a maximum week of fifty-four hours for hewers. 'A man,' says Mr. Hewlett, 'has his drawer with him, the person who hauls the coal from where it is cut to the nearest mechanical appliance, and they refuse to work without these drawers, and consequently, by limiting the hours of labour of the boys, the hours of labour of the men have diminished.'⁶ It was calculated that in Northumberland and Durham the Act had shortened the hours of hewers by one hour in the fortnight.⁷ Apart, however, from any effects of the Act, the high wages prevailing during 1872 led to a very general reduction in the average number of hours worked per week by the hewers. Why was this? The answer lies in the fact that the hewer, like every other member of the community, aims at a certain 'standard of comfort,' and when that is realized he prefers to take subsequent improvements in his economic position in the form of greater leisure. Eight hours is the maximum day at which the miner aims, and when the conditions of industry enable him in that time to earn his standard wages, he prefers to reduce his hours rather than increase his wages.

We have now to consider the effect of the reduction of hours

¹ Q. 688.

² Q. 1228-1230.

³ Q. 1390.

⁴ Q. 901.

⁵ Q. 2449, 2452.

⁶ Q. 1984.

⁷ Q. 3037-3041.

upon the output of the mine. The average output for each man employed for the five years 1868-72 was as follows:—

	Number of Men.	Average yearly output per man in tons.
1868	346,820	302
1869	345,446	316
1870	350,894	321
1871	370,881	317
1872	413,334	299

From this table it appears that between the years 1871 and 1872 the average output decreased by 18 tons. The Select Committee comment on these figures as follows:—

‘The comparison between 1872 and the former years is affected by the facts that the previous returns were not compulsory, and did not include in all cases the whole of the persons employed in the mine and about the colliery, nor do the returns admit of any account being taken of the saving of labour either in the mine or above ground in consequence of improved arrangements for working the collieries or delivering the coal into the waggons for transport. The evidence given in some individual cases shows that the quantity raised per man has diminished in the last year, and on the whole your Committee think that the diminution in the yield per man employed in getting coal in the mine since 1871 is not much less than that shown in the table.’¹ The evidence apparently bears out this conclusion: under shorter hours the output per man was reduced in Northumberland and Durham,² Lancashire,³ and Yorkshire,⁴ whilst it was increased in South Wales, where no change was made in hours,⁵ and in North Staffordshire;⁶ but on the average there was a substantial reduction. The Committee omit to point out that the whole of this reduction cannot be attributed to the shortening of hours. The new men who flocked into the industry were unskilled in coal mining. It was not to be expected that an agricultural labourer or a factory operative who had never handled a pick in his life could hew the same quantity of coal in a given time as a skilled miner, and some reduction per head was to be expected. But whilst the output per man was reduced, the total output was increased.

¹ Report, p. v.

² Q. 3029, 1353.

³ Q. 1967, 1685.

⁴ Q. 2712.

⁵ Q. 1519.

⁶ Q. 1991.

The total production of coal during the years 1869-72 was as follows :—

Years.	Tons.
1869.. .. .	107,299,634
1870.. .. .	110,289,722
1871.. .. .	117,186,278
1872.. .. .	123,386,758

Hence it appears that, notwithstanding the reduction in hours, the output of coal was increased in the year 1872 by nearly five and three-quarter millions of tons. An examination of the evidence tends to show that the chief causes of the increase in output were (1) the development of old mines, and (2) the opening of new mines.

(1) The Select Committee expressed the view that 'there is no doubt of the capacity of existing collieries to keep up the present supply of coal, and that with an adequate provision of suitable labour the supply could be largely increased; but a period of time extending over several months is requisite to open out or to extend new workings, and to qualify workmen who have been otherwise engaged for the special employment in the collieries.'

In order to develop the mines a greater proportion of the total workers employed were sent down the pit. 'Every effort,' said Mr. Dickenson, the Inspector of Mines of the North and East Lancashire District,¹ 'has been made on the part of colliery owners and managers to get out a great quantity, and the high wages have been inducing persons who perhaps have been working as day men in the collieries to become pit men.' In other words, the number of day men were reduced, and the number of pit men increased.²

(2) Old pits were reopened and new pits sunk. The high prices led to the opening up of new collieries.³ Large numbers of persons were attracted from other industries, but in some districts there was a scarcity of men.⁴ The official statistics give the total number of men employed as 370,881 in 1871, and 413,334 in 1872, but, for the reasons already stated, the former figure cannot be taken as quite accurate. Time was required to train the new workers, and even then they never became possessed of the same skill as those who had been brought up in the pit. Farm labourers who had been accustomed to rough work proved to be the best material,⁵ as they possessed the physical strength that was wanting in the cotton or silk-spinner.

¹ Q. 144.

² See also Q. 3556.

³ Q. 1929-1931, 2129, 6131.

⁴ Q. 2128.

⁵ Q. 3745.

It is very important to bear in mind that the high prices of coal from 1871-1873 were not the effect of the reduction in hours to any important extent. The order of events was, first, a greatly increased demand for coal, due to prosperity in the iron trade; secondly, a consequent rise in price; thirdly, a great increase in wages; and, fourthly, a reduction in hours. In other words, the reduction in hours was the result of high prices. Only in so far as the reduction in hours tended to prevent the output expanding as fast as it would otherwise have done could it be said that it affected the output. This reduction was confined to Northumberland, Durham, and some parts of Lancashire. In the other coal districts the output per man was either maintained or increased.¹

The years subsequent to 1873 are also worthy of study. Prices were high in 1874 and 1875, and then fell rapidly. In South Wales smokeless steam coal f.o.b. at Cardiff averaged 15s. in 1872, 23s. in 1873, 16s. 6d. in 1874 and 1875, 10s. 3d. in 1876, 9s. 9d. in 1877, and 8s. 6d. in 1878. During these years the output of coal kept increasing, while the demand for coal steadily decreased. Wages fell, and the hours of labour were lengthened. The miners had then the choice of one of two courses, either to lengthen the working week or earn less wages. They adopted the former course, but even then they were unable to maintain wages.

The cotton-spinner has had to face a similar reduction in the rate of wages, but fortunately for him the use of improved machinery has enabled him to earn larger weekly wages at the reduced rate than he earned previously. But the miner is unable to avail himself of such a method of increasing production. His only resource is to hew more coal by remaining longer hours in the mine. This then is the point at which an eight hours day may cease to be observed, unless the miners adopt the principle of the working men in Victoria, that no matter what reductions take place in wages, they will not depart from their standard day.

In restricting this paper to the probable effects of a reduction of hours on the output and on wages it is not to be supposed that there are not other important aspects of the question. But the most important objections to an eight hours day for miners fall under one or other head. The mine-owners, in their reply to the miners, dwelt upon the increased cost of production, upon foreign

¹ Q. 1991.

competition, and the rise in price to the manufacturer. All these points depend on the output. If the total output be maintained there will be no rise in price, and no disadvantage as regards the foreigner; if the output per miner be maintained there will be no increase in the cost of production. As regards wages, if the total output and the output per miner be maintained, wages will not be affected by the reduction in hours. An attempt was made by the mine-owners to show that 'inland coalfields compete at a disadvantage with those on the seaboard. You will only slightly increase the disadvantage and shut out the inland coal-fields to a large extent from the markets on which they depend.' But this argument is at variance with the statements put forward by lessees before the Royal Commission on Mining Royalties. Mr. Alfred Barnes, M.P., and other lessees pointed out that the geographical position of a mine was always taken into account in fixing royalties. Any disadvantage attaching to inland coal-fields falls on the royalty owner and not on the lessee who works the mine. Space, however, will not permit the further discussion of this argument.

In conclusion, it may be pointed out that the miners themselves have the greatest possible interest in maintaining their individual output. Any rise in prices leads, as we have seen, to the development of new coal-fields, and if the miners by restricting production raise prices and increase the number of those employed, the depression that ensues when bad times arrive is intensified. One of the main causes of the low wages subsequent to 1876 was the impetus given to the coal industry in 1872 and 1873. Hence self-interest would impel the miner to endeavour to maintain production.

J. E. C. MUNRO