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A  
DETERMINATION  
OF THE  
AVERAGE DEPRESSION  
OF THE  
*PRICE OF WHEAT IN WAR,*  
BELOW THAT OF THE  
PRECEDING PEACE;  
AND OF ITS  
*READVANCE IN THE FOLLOWING;*  
ACCORDING TO ITS YEARLY RATES FROM THE REVOLUTION  
TO THE END OF THE LAST PEACE:  
WITH  
REMARKS  
ON THEIR GREATER VARIATIONS IN THAT INTIRE  
PERIOD.

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1800.

THE  
 DEPRESSION  
 OF THE  
 PRICE OF WHEAT IN WAR, &c.  
 SECTION I.  
*Present Importance of the Subject.*  
 THE difference of the effects of war and peace on the prices of bread-corn, is, from the singular rates of the market at this time, a subject of discussion of the first importance. An opinion is entertained by some, and encouraged by others of better information, that the natural tendency of the state of war has been at all periods, to raise the rates of the market: this is propagated, not in obscure meetings, but legal assemblies: and the committee appointed by the corporation of London, to inquire into the rise of the price of provision, has been openly censured in court, for suppressing in their report all mention of the war, which was asserted to be the leading cause of it, and the same persons have returned to the repetition of this erroneous and inflammatory position; on occasion of a plan now under the consideration of the corporation.

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The circumstances of these times, in which we are attacked by foreign war and by sedition at home, render this an error pregnant with the worst of dangers: the populace will yield a ready ear to the demagogue or agitator who is able to persuade them, that he is possessed of a cure for any sufferings they may labour under: and this kingdom never contained in it, such an army of enemies of this description. The calamities of adverse seasons, they persuade the uninformed class to be the guilt of their governors; and that they themselves are their only true protectors; the only persons attentive to their interests, which can be secured solely by embracing their measures. The ruin the diffusion of such a belief may bring upon us needs not to be enlarged on: in this state of suffering of the poor, the seeds of commotion are widely sown; and the eruption of a single riot may be the commencement of a formidable insurrection; and that the signal of more.

## SECTION II.

*The Question, whether war increases the price of Corn?  
treated on general principles.*

THERE are two ways which may be employed to investigate the difference of the effects of war and peace on the prices of wheat in past periods;  
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in order to determine how far its present rate is to be ascribed to the former. The first by general principles, as they are called; the second from yearly registers of prices for periods of sufficient duration. In the first mode, the causes tending to advance or depress the rates of the market both in war and peace, may be enumerated: but when we have done this, no precise result can be deduced from them; we being unable to assign, *numerically*, the effects of any one of either kind; and consequently to strike a balance between the respective sums of both. An advantage may indeed probably appear on the one side or the other: still the conclusion from the nature of such arguments, the results of which are probabilities of an indefinite magnitude only, will not be so cogent as to silence a determined opponent.

The general allegations, on which I conceive it will be attempted to show, that war raises the price of provisions, and principally corn, are the following. 'It always is attended with a train of  
' new taxes, which although they be not primarily  
' laid upon corn, yet circuitously raise the market;  
' for if the tax be laid on leather, tea, sugar, or  
' any other article of his consumption, the farmer  
' must sell his corn for so much more to the shoe-  
' maker, the grocer, or other vender of the newly  
' taxed article. War beside, by diminishing the  
' number of the cultivators of the land, must  
' diminish

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‘ diminish the quantity of its product and enhance  
 ‘ its prices: whereas in peace, the capital of the  
 ‘ farmer annually increasing, new lands are  
 ‘ yearly cultivated, old ones improved, and the  
 ‘ quantity of corn raised greatly augmented. And  
 ‘ lastly, the demand for the army and navy is  
 ‘ great, and must produce an effect on the rate of  
 ‘ the market proportionally great.’

On the contrary, it is to be urged, that this circuitous effect of taxes, if not absolutely an ideal allegation, can be in amount very little. If the consumption of the newly taxed commodities be not diminished, an effect which very seldom takes place, in proportion to the augmentation of their prices, and frequently not at all, the whole body of the consumers will have so much the less to expend for all other articles jointly; the prices of which must be reduced, or part of them remain unfold: a point fully confirmed by the experience of the first (A) 56 years following the revolution. A part of our soldiers and land-men for the navy are taken from the cultivation of the land, but a greater number is taken from cities and great towns, in proportion to their population. As the former are the producers, so the latter are the consumers of corn: the inhabitants of the villages are estimated to be in number double to those in the cities and great towns\*. Now if all so taken had

\* Price, Rev. Payments, v. ii, p. 178.

been

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been employed in foreign countries and subsisted on their products, and if it should be gratuitously allowed, that the product of corn would be diminished in the proportion of the hands employed in cultivation; yet the demand of the people remaining in their dwellings, will decrease with the number of non-productive consumers, that is, in a greater proportion. Therefore, if all our soldiers and sailors had been employed on foreign services, and subsisted on foreign product, there would be a great fall of the price of bread-corn. But a great part of them have actually been during the war so employed in the East and West Indies, our garrisons, on the continent, and in Ireland. To these are to be added the ordinary and able seamen of the navy on many foreign stations; who having been sea-faring men before, were chiefly subsisted by the corn of this island, and are now chiefly supported by that of other countries: and there remains another considerable article to be brought to account, the supply of that part of the whole body of officers, which may be taken as permanently absent; and who were before consumers not producers of corn. Thus on the aggregate it appears, if the quantity of corn raised be taken to be a little diminished, the demand for it is reduced in a much greater ratio.

And in what is already said, the answer to the last reason alledged to shew that war must raise

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the price of corn, is in a great measure anticipated. Our land and sea forces are greatly increased in war; and the augmentation, it is certain, is partly supplied by corn purchased by public contract; but in peace those men had intirely been fed by corn purchased by themselves of the farmers, or by private contract by millers and merchants; and, if a small diminution of the product be admitted, the diminution of the purchases will counterbalance it. Beside, the corn being purchased by great contractors to supply government, they will procure it cheaper than the consumer, who buys his wheat of the farmer, or even than the merchant in extensive business; which tends to keep the market lower.

There remains to be considered only a single allegation brought to show that war raises the price of corn. It is contended 'that war, by diminishing or suspending the increase of the productive capital of the farmer, prevents his being able to break up and cultivate new lands, or improve the cultivation of old ones.' But this may be produced as an instance to show how speciously a position in its general terms may appear, which is totally contrary to fact. If war diminish the capital of the farmers, it must affect equally those who reside near waste lands proper for inclosure, and those who do not. If the former so abound in capital, that the number of those who can enter

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on the expensive operation of breaking up waste lands be, in war, increased beyond any example of a former term of peace, the latter have the ability of pursuing other improvements increased in the same proportion. It appears, on the best authority, that the number of the bills of inclosure in the latter half or five years of the last peace, exceeded that of the former, in the proportion of 17 to 10: Now the number of these bills in that last term of five years was 173, and the annual average 34\*; but in the first four years of war, or to the end of 1796, 283, and the yearly average 70†: these improvements in the last peace had exceeded all former precedents; but in war the farmers were able to command a capital sufficient to execute more than twice as much: and they who had occasion for money for improvements of another kind, in like manner either had it, or were able to acquire it with equal facility. War therefore had not, until the end of the year 1796, retarded the celerity with which improvements in agriculture were going on at the end of the peace: it was, in fact, from that term, greatly accelerated.

\* Estimate, Chalmers, 1794, p. 275, Bills for Inclosures and Draining, &c. the total of the last five years was 179. The inclosing bills of the period were 173.

† Report of the Secret Committee of the House of Lords, Appendix, No. 44, p. 245.

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From

From the commencement of 1797 to the present time, the evidence of this point is of another kind: we possess no documents for those years, so particular as the Estimate of Mr. Chalmers, or the Report of the Lords' Committee. But immediately before the beginning of the term, the interest made by purchases in the funds was higher than at any period since the death of William: the inducement to employ money in the purchase of fixed income, rather than as productive capital, was therefore greater: but this inducement decreases the frequency of making an active use of capital in commerce or agriculture: the facility of acquiring which, increases in proportion as the price of stock increases. And taking the present rate of the three per cents in the market at £63 per cent, it has been augmented, during the term, nearly in the proportion of 4 to 3. The facility therefore of making inclosures and improvements of land has, since the beginning of 1797, been greatly augmented: inability in the farmers, to make improvements, occasioned by the war, cannot therefore be among the causes of the high price of corn.

## SECTION III.

*The Prices of Wheat for the period since the Revolution, and its division into terms of War and Peace.*

THUS reasoning in general terms, there appears ground to infer, that war does not tend to increase the price of corn. But the evidence arising from the comparison of the rates of the market, in the terms of war and peace occurring in a past period of sufficient length, is much superior by its definitive precision, and higher in its nature. From that evidence there lies no appeal to other discussions of any kind.

The period to be taken for that properly commences with the revolution, and terminates with the last completed period or peace. It was then Great Britain took her natural position in the system of the European powers, which in conjunction with her individual interests, or supposed interests, has determined the frequency, extent, and duration of her subsequent wars, and will continue to determine them.

TABLE of the Price of a QUARTER of WHEAT, in every Year of every Term of War and of Peace; with the Average of each Term, from the Revolution to the End of the Peace of 1783.

<i>1st War of Revolution.</i>			<i>2d War of Spanish Succession.</i>		
Years.	£.	s. d.	Years.	£.	s. d.
1688	2	6 0	1702	1	9 6
89	1	10 0	03	1	16 0
1690	1	14 8	04	2	6 6
91	1	14 0	05	1	10 0
92	2	6 8	06	1	6 0
93	3	7 8	07	1	8 6
94	3	4 0	08	2	1 6
95	2	13 0	09	3	18 6
96	3	11 0	1710	3	18 0
97	3	0 0	11	2	14 0
			12	2	6 4
10 Years -	25	7 0	11 Years -	24	14 10
Average - -	2	10 8	Average - -	2	4 11

  

<i>1st Peace of Ryswick.</i>		
Years.	£.	s. d.
1698	3	8 4
99	3	4 0
1700	2	0 0
1701	1	17 8
4 Years - -	10	10 0
Average - -	2	12 6

2d Peace

<i>2d Peace of Utrecht.</i>			<i>3d War of Flanders.</i>		
Years.	£.	s. d.	Years.	£.	s. d.
1713	2	11 0	1740	2	10 8
14	2	10 4	41	2	6 8
15	2	3 0	42	1	14 0
16	2	8 0	43	1	4 10
17	2	5 8	44	1	4 10
18	1	18 10	45	1	7 6
19	1	15 0	46	1	19 0
1720	1	17 0	47	1	14 10
21	1	17 6	48	1	17 0
22	1	16 0			
23	1	14 8	9 Years - -	15	19 4
24	1	17 0	Average - -	1	15 5
25	2	8 6			
26	2	6 0			
27	2	2 0			
28	2	14 0			
29	2	6 10			
1730	1	16 6			
31	1	12 10			
32	1	6 8			
33	1	8 4			
34	1	18 10			
35	2	3 0			
36	2	0 4			
37	1	18 0			
38	1	15 6			
39	1	18 6			
27 Years -	54	9 10	6 Years - -	11	9 2
Average - -	2	0 4	Average - -	1	18 2

  

<i>3d Peace of Aix la Chapelle.</i>		
Years.	£.	s. d.
1749	1	17 0
1750	1	12 6
51	1	18 6
52	2	1 10
53	2	4 8
54	1	14 8
6 Years - -	11	9 2
Average - -	1	18 2

4th War

<i>4th War—American Boundaries.</i>			<i>5th War—Revolt of Colonies.</i>		
Years.	£.	s. d.	Years.	£.	s. d.
1755	1	13 0	1775	2	8 4
56	2	5 3	76	1	18 2
57	3	0 0	77	2	5 6
58	2	10 0	78	2	2 0
59	1	19 10	79	1	13 8
1760	1	16 6	1780	1	15 8
61	1	10 3	81	2	4 8
62	1	19 0	82	2	7 10
8 Years - -	16	14 8	8 Years - -	16	15 10
Average - -	2	1 10	Average - -	2	1 11
<i>4th Peace—First of Paris.</i>			<i>5th Peace—Second of Paris.</i>		
1763	2	0 9	1783	2	12 8
64	2	6 9	84	2	8 10
65	2	2 8	85	2	1 10
66	2	3 1	86	1	18 10
67	3	4 6	87	2	1 2
68	3	0 6	88	2	5 0
69	2	5 8	89	2	11 2
1770	2	9 0	1790	2	13 2
71	2	7 2	91	2	7 0
72	2	10 8	92	2	2 4
73	2	11 0			
74	2	12 8			
12 Years -	29	14 5	10 Years -	23	2 0
Average - -	2	9 5	Average - -	2	6 2

And

And the Prices of the First Six Years of the uncompleted Term of the present War, have been.

*Present War.*

Years.	£.	s. d.
1793	2	8 4
94	2	11 4
95	3	14 5
96	3	17 3
97	2	12 9
98	2	9 7
6 Years - - -	17	13 8
Average - - -	2	18 11

This



This Table being the foundation of the conclusion to be deduced on this important subject, an account ought to be given of the authorities on which its parts are founded, and of the division here made into terms of peace and war.

The prices of the quarter of wheat, to the year 1764 inclusive \*, are taken from Dr. Adam Smith's work on the Wealth of Nations: the same prices have been copied and continued to the present time, by the Rev. S. Hodson †, but he quotes for it the authority of Smith's Corn Tracts. And the quarter he states to be of eight standard Winchester bushels: It is material to add, that in this he is supposed here to be correct. (B.)

Mr. Hodson has given a supplement to the tables of Smith, to the end of the year 1798; in which he takes the price of the year 1765 from that of Windsor market; of the following years, to 1770 inclusive, from Lord Hawkesbury's office; and of the remaining years from Mr. Catherwood's tables.

Some remarks are necessary to be made on the division of the whole period, consisting of 111 years, into terms of war and peace. The duration of a term of war, is not properly that elapsed be-

\* Vol. i. p. 404. Edit. 3d.

† Appendix to Sermon, "Dearness occasioned by Scarcity, not Monopoly," p. 39.—1800.

tween

tween the formality of its proclamation, and the proclamation of the following peace: it more accurately is taken to begin at the first noted act of hostilities, and to end at the day of their cessation by compact. Beside, no such declaration was made of the last war with France.

Our greater wars only are to be admitted into the account, or all those in which that power took part against us. Our petty hostilities against Spain, taking place in the long term between the peace of Utrecht and the year 1740, are totally passed by and not admitted as such. These, which a satirical writer in the Craftsman, called "our peaceful wars \*," are included in the term of 27 years of peace. It is true, war was declared against Spain in the month of December, 1718: the peace establishment of the navy was at that time 10,000 men †, and for the years of war 1719, and 1720, there were voted 13,500 ‡: it was terminated in the summer of 1721. The treaty of Hanover, in 1725, led to new hostilities against that power: in 1726, 10,000 men were voted for the navy; and in the following year 20,000: and after some ineffectual hostilities, articles of agreement were signed in May, 1727. The peace establishment of the navy was in 1733, of 8000 men;

\* "Our peaceful wars and warlike peace."—loc. incert.

† Post. Hist. Rev. p. 114, 121.

‡ Ibid. p. 116, 117.

but

but in consequence of a dispute breaking out with the same kingdom in that year, it was increased in 1734, to 20,000; and in 1735, to 30,000 men\*. The two last terms of peace together, amounted to twenty-two years; but our occasional armaments were much more important. These equipments against Spain therefore are to be considered only, as smaller armaments in a long peace: and the three terms are to be here regarded as wars in name only; for the effects of war in the corn market will be as our exertions; and when those are small, the former will not be discernible in the prices; being intirely concealed by the much greater effect of the variation of the products of seasons.

James the second had a strong army on foot during the whole of the year 1688; and a navy fully equipped for several months of it. Moreover, the Dutch army was in the kingdom, and their navy in our ports at the conclusion of it: this is therefore taken as an effective year of war.

The duration of war, determined as above, must generally consist of an integer number of years with an added fraction: for hostilities may break out nearly at the conclusion of a certain year; continue uninterrupted for a number of intire years, as eight, and terminate in the beginning of the next: thus there will have been war in ten

\* Post. Hist. Rev. p. 131, 133, 159, 161, 163, 165.

successive

successive years; but its duration may not be more than nine, or very little exceed eight. A superior accuracy in tables of this kind might be obtained, by giving an account of the duration of hostilities in months; but the neglect of it will here produce no discernible effect on the results to be derived from this; where an integer number of years is assigned to every war, approaching the most nearly to its true duration.

**SECTION IV.**

*The determination of the proportion of the price of Bread Corn in War, to that of the following Peace.*

FROM the averages of ten complete terms of war and peace, beginning with the year of the revolution, as given in the last table; it appears that on an average, the price of wheat in peace has exceeded that in the preceding war, considerably more than *£.5 per cent.*

This is manifest, by collecting the averages into a table of the due form, in the following manner.

C

	Years.	War.	Years.	Peace.
I.	1688   10	2 10 8	1698   4	2 12 6
II.	1702   11	2 4 11	1713   27	2 0 4
III.	1740   9	1 15 5	1749   6	1 18 2
IV.	1755   8	2 1 10	1763   12	2 9 5
V.	1775   8	2 1 11	1783   10	2 6 2
Number of Terms		5 10 14 9		11 6 7
Great Averages		2 2 11		2 5 3

Hence it appears, that in a period of 106 years, in every war on the average of the whole time, the price of wheat has been 2*l.* 2*s.* 11*d.* a quarter; and in every subsequent peace, 2*l.* 5*s.* 3*d.* the latter rate exceeding the former 5*l.* 8*s.* 8*d.*  $\frac{1}{2}$  per cent.

Those who loudly contend that war raises the price of corn, must at the same time admit, that the two different states of peace and war, have different but permanent and natural effects on the rates of the market: and what those effects are they cannot deny to be demonstrated by the rates themselves; nor that an average of 106 years is on a scale extensive enough to exclude the effects of the accidents of seasons. Or, in other words, that the number of years of great abundance and of great scarcity shall be found therein, in the same proportion to each other, which from natural causes unknown to us, permanently obtains. And that

that therefore the above table exhibits to us what is the true nature of the effect of each state, and its measure, indefinitely near the truth. And the difference of the two states, if unchecked, will operate in the same manner and with the same force in the market, whatever the plenty or the scarcity of a year of war may be: that is, keep the proportion of its price in war to that in peace the same: unless the danger or apprehension of a commotion in war, on account of high prices, may induce the government of a country to use greater vigilance, and employ more effective measures to keep them down. Wherefore if a due comparison could be instituted between the prices of wheat, in two equal terms of years immediately following each other, the first of war and the second of peace; in which every circumstance, such as the product and all others affecting the market (the two states exclusively excepted) should be the same; the excess of the rate of the latter term above the former shall be 5*l.* 8*s.* 8*d.*  $\frac{1}{2}$  per centum, as before determined.

Therefore, taking the price of wheat at this time at 6*l.* 6*s.* the quarter, it appears that if peace had been made in the last or any preceding year of the war, the market value at the lowest probable rate, would have exceeded that now taking place by 5*l.* 8*s.* 8*d.*  $\frac{1}{2}$  per cent; and amounted to 6*l.* 12*s.* 10*d.* or 6*s.* 10*d.* more: according to the actual

actual average proportion of the prices of war and peace, which has taken place during 106 years before its commencement (c).

It is seen in the table, that there was one term of peace in five, that of 1713, in which the price of corn fell below that of the preceding war; and one of war wherein the average was higher than in the preceding peace, the war of 1755. The consideration of these anomalies would run to a length separating the last conclusion too far from that next to be investigated, which is very closely connected in its nature to it: It is therefore postponed for the present.

SECTION V.

*The determination of the proportion of the price of Bread-Corn in Peace, to that of the following War.*

FROM the averages of the price of wheat for eight complete terms of peace and war, beginning with the first term of peace in the table, that of Ryfwick, in the year 1698; and ending with the last war or with the year 1782; comprehending a period of 85 years; it appears that the price of wheat in peace, has exceeded that of the following war somewhat more than 9*l.* per cent.

Here

Here the peace of the year 1698 is to be taken as the first term in the table of averages, and the war of 1775 as the last: and it will stand thus:

	Years.	Peace.		Years.	War.
		£ s. d.			£. s. d.
I.	1698	4 2 12 6	II.	1702	11 2 4 11
II.	1713	27 2 0 4	III.	1740	9 1 15 5
III.	1749	6 1 18 2	IV.	1755	8 2 1 10
IV.	1763	12 2 9 5	V.	1775	8 2 1 11
Number of Terms		4 9 0 5		4	8 4 1
Great Averages -		2 5 1			2 1 0

One remark is to be made on the formation of this table, before any deductions are drawn from it: the columns must contain an equal number of terms, and each line two; the average of a completed term of peace, and of the war which followed it. Hence that of the peace of 1783 is of necessity excluded for two reasons: the average of the war following it is yet unknown; and until it be concluded, it is impossible to assign it: and secondly, the object of these investigations is to compare the prices of the present war, and their relations, with what experience has pointed out those of others to have been for a very long term past; therefore in order to institute that comparison rightly, those past rates are to be kept apart from the former: for from such separate statement alone

it can be clearly determined, whether the present high prices be the effect of war, as such, or of other causes operating at the same time, and raising the market.

This being premised, we may proceed to the deductions from the table.

The fifth war ended with the year 1782; whence it appears, that during the whole period of 85 years then elapsed, the average price of the quarter of corn in every term of peace having been 2*l.* 5*s.* 1*d.* and in the succeeding war 2*l.* 1*s.* the former rate exceeded the latter by 9*l.* 19*s.* 2*d.* *per cent.* And if in any one year of those four terms of war, the scarcity of corn had been such, as to have raised its price to 6*l.* 6*s.* per quarter; supposing the same deficiency, or other circumstances determining the rate, had taken place in the preceding peace, the selling price would have been 6*l.* 18*s.* 6*d.*  $\frac{1}{2}$  per quarter: and if such an event had happened in any year of the last peace, such is the price to which wheat would have risen. Hence if this proportion be applied to the average price of wheat in the last peace, 2*l.* 6*s.* 2*d.* it will appear, that according to the variation of the term of 85 years found above, that average rate of the following or present war, would not have exceeded 2*l.* 1*s.* 11*d.*  $\frac{3}{4}$ . Nor is it to be presumed that its effect totally differs in nature and kind from the average effect of preceding wars; the difference therefore

therefore between the above rate, and that now obtaining in the market, is to be attributed to causes independent of the war.

In the former part of the intire period of 106 years, the price of wheat was decreasing: in the latter it increased again, but the re-augmentation appears, upon the face of the table, not to have been equal to the decrement. Thus we see the mean average of a preceding peace, exceeds that of the intermediate war, by 9*l.* 19*s.* 2*d.* *per cent.*; and that of a following peace, exceeds that intermediate price, by 5*l.* 8*s.* 8*d.*  $\frac{1}{2}$  only: the arithmetic mean of which two rates, is 7*l.* 13*s.* 11*d.*  $\frac{1}{2}$  *per cent.* Now by the construction of the table, these are the relations of the prices when the ordinary circumstances of peace and war obtain: therefore, when the two terms of peace and the intermediate war are of the average length, be that what may; whence the lengths of the two terms of peace are to be taken equal. And the average price of every peace, is evidently that of the middle of the term: and the distance in time from the first peace average to the second, will be compounded of the following three parts: First, the latter half of the first term of peace; secondly, the whole intermediate term of war; and lastly, the first half of the succeeding peace, equal to the latter half of the preceding; because their whole terms are equal. And between the extreme instants of each of the

half terms, or middle of the two terms of peace, a decrement of prices had taken place. Now if peace had continued during the whole of this compounded period, and the decrement had been supposed to have gone on equally in every year, which, in that circumstance, is the due assumption; then the price in the middle of the intermediate years, now taken as a term of peace instead of war, would have been the arithmetic mean between that of the first year of the first, and the last of the second half term of peace as above: which also would be the average price of the whole intermediate term, if the first peace had continued throughout the whole of it; and would have exceeded the actual average of the war by 7*l.* 13*s.* 11½*d.* per cent. taking therefore the price of wheat at any assigned rate in a year of war, if the preceding peace had continued to the end of that year, the rate would have been higher by 7*l.* 13*s.* 11½*d.* per cent. Thus the price of wheat in any year of war being six guineas a quarter, the price in that year, if peace had been prolonged thereto, would have been 6*l.* 15*s.* 8½*d.*; exceeding the former by 9*s.* 8½*d.* the quarter. (v)

## SECTION VI.

*The fall of the Price of Wheat in War of 1702, equal to the mean of that preceding and following Peace.— It rises in the War of 1755: but with less celerity than the mean of preceding and following Peace.*

AMONG ten terms of war and peace a single instance is found, in which the average price of wheat in peace has fallen below that of the preceding war. That of the peace of 1713 was 2*l.* 0*s.* 4*d.* per quarter, but of the preceding war 2*l.* 4*s.* 11*d.*

But the particular circumstances of the account show the seeming irregularity to form no exception to the general conclusion, that peace does not tend to reduce the price of bread-corn: for from the end of the year 1699 to that of 1744, or during an entire period of forty-five years, a great fall took place in the price of wheat, having been in the first term 2*l.* 12*s.* 6*d.* the quarter, and in the last 1*l.* 15*s.* 5*d.*: and its progress, it must be observed, was not uniform but undulating. And in such a case, if the price of the first war fall below that of the first peace, and the rate rise again at the beginning of the second; and after such first increase it begins again to fall, and the fall be continued a certain number of years, it may at length become less than the War price: and the operation of the causes of this decline being sufficiently

sufficiently further prolonged, the average of the whole term may fall below that of the preceding war; as will appear to have been the case in the instance given above.

For the war of Anne being effectively ended by the cessation of hostilities in 1712, its average was 2*l.* 4*s.* 11*d.* Six years of peace followed; the average of which term was 2*l.* 6*s.* 1*d.* In the short hostilities, not noticed in the table, which broke out with Spain, that rate amounted to 1*l.* 16*s.* 0*d.* only: and between that and the little war of 1734, there was another term of thirteen years, in which the average price of wheat rose again 2*s.* and 11*d.* the quarter. War recommenced in 1734; but corn advanced in the two years it continued 2*s.* the quarter, owing to some considerable falling off of the crops of 1735; an event against which it is not contended that war is a preservative. A peace of four years ensued, in which it fell to 1*l.* 18*s.* 1*d.*

Upon account of the small scale on which these wars were carried on, the years in which they took place are, in the general table, included in the long term of twenty-seven years of peace. But if the years elapsed between the conclusion of 1712; and that of 1733, had been divided therein into two terms of peace, and one of war, and their averages taken; the war price of corn would have been found to be less than either that of the preceding

or

or following peace. But that of the short war of 1734 will thus appear anomalous. (E)

To put this in another point of view: it is now to be proved, that taking the duration of the peace of Utrecht at twenty-seven years, as in the tables; the price of wheat having been falling from the beginning of the peace of Ryswick, to the end of the former; the great war of the Spanish succession did not retard that fall.

From the prices of the three terms given, and the duration of each, we are able by a method of calculation first given by Sir Isaac Newton, to assign the most probable price, on any instant of time between the middle of the first and last term: and thence to get the prices of the first and last day of the war. (E)

The average price of the war of 1702 (which will be here most conveniently so expressed) was 539*d.*; and it is to be taken as that of the middle term thereof: and its duration being eleven years, there were five years and a half of it unexpired. The length of the following peace was twenty-seven years: of which, at the middle term, there were thirteen years and a half unexpired; when the rate was fallen to 484*d.*: and the period from the middle of the preceding war to the middle of the peace was nineteen years. Moreover the average price of the term, in the middle of the war of 1740 was 425*d.*; and the semi-term of war four years and

and a half: the distance of time, therefore, from the middle of the peace to that of the following war, was eighteen years.

From these elements, proceeding by the method of calculation above referred to, it appears, that at the instant of the commencement of the peace, or when five years and a half were expired after the middle of the war; the average price of corn is most justly to be assigned at 523.84*d.*: and at the end of the peace, or thirty-two years and a half after that term, it became 440.41*d.* Its decrease therefore, during a peace of twenty-seven years, was 83.43*d.*: or its mean annual decrement, 3.09*d.*

Again the price in the middle of the first war having been 539*d.*; and in that of the second 425*d.*; the difference was 114*d.*; the sum of the decrements of peace and the two half terms of war. And the former having been 83.43*d.* the latter was 30.57*d.* But the two whole terms of war having been together twenty years, and the two halves ten; their mean annual decrement was 3.057*d.*: nearly equal to that of the intervening peace, 3.09*d.*: the former having fallen short of the latter by 1*l.* 1*s.* 8*d.* per cent. only.

By the inspection of the original table it also appears, that the price of corn rose, in the war of 1755, above the average of the preceding peace: and that excess was considerable, 3*s.* 8*d.* the quarter. This seems an objection against what is

here

here advanced, on which some may be disposed to dwell with pertinacity.

To consider this in a popular way: it is seen by the same table, that in the term of peace following that war, the average rose still higher; exceeding that of the war by 7*s.* 7*d.* the quarter; or something more than double the advance taking place in the war. The three terms form a period of twenty-six years, in which the price of corn was increasing with considerable celerity: this must have been owing to some cause, the effects of which, war, although it could not preclude entirely, might by its proper tendency diminish: and the advance of twelve years in the following peace, having been more than double that of eight years of war, indicates this to have been the case.

And the justice of this conclusion is fully proved, by a comparison of the mean annual increment of the price of corn, in the two half terms of the peace of 1749 and 1763, and that of the intervening war of 1755. For proceeding as before, we find the price of corn at the middle instant of the first peace, or the beginning of the year 1752, to have been 458*d.* per quarter: the term to the middle of the war 1755 was seven years, and the price 502*d.*: from thence to the middle of the following peace, there elapsed ten years; and the value of corn was now become 593*d.* Whence by



the Newtonian method of differentials as before, at the end of three years after the middle of the first peace, or the instant of the termination thereof, the price of wheat was become 474.87*d.*; and at the end of the war, which lasted eight years, or at the end of eleven years after the middle of the first peace, that price had increased to 534.39*d.* or its increment in eight years of war, was 59.52*d.*; the yearly average of which was 7.44*d.* But the total advance of price, between the middle of the first and second of these terms of peace, was 135*d.*; and that of eight years of war having been 59.52*d.*, that taking place in the nine years of peace, was 75.48*d.*; and its yearly average 8.38*d.*—therefore the annual augmentation in peace, exceeded that in war 12*l.* 12*s.* 8*d.* per cent.

It has been seen above, that war does not tend to retard a fall of the price of corn taking place from causes, be they what they may, operating for long periods: for in the only period, that of the war of 1702, in which such an effect could be supposed to have attended it, the annual measures of the fall in war and peace were found to be sub-equal. And as in the other four periods, the price of wheat, in peace, is constantly found to rise above that of the preceding war, that equality must be ascribed to some *cause perturbing* the rates of the market; such as considerable variations of the quantity of the product

product in the period in which it took place, or other circumstances affecting prices in an unusual but similar manner. And as to the results of the comparison for the war of 1755, it is to be noted, that although a war appears, in every instance, to generate a fall, or retard an advance, it cannot totally prevent; yet the measure of the excess of the annual augment in peace, above that in war, found for that period 12*l.* 12*s.* 8*d.* per cent. seems also to have been increased by a perturbing cause, but acting in an opposite direction to the former, and affecting the market anomalously, and with great strength.

For in all other periods comprehended in the table, except those above examined, a fall of prices in war, is constantly observed to take place: and from this it should follow, that its effects are to accelerate a decrease, and retard a rise of prices taking place in peace, which are operations of the same power. It is now to be inquired, how far this agrees with the two last results combined with each other.

In order to this let it be supposed, that the measure of this effect of war was constant or equal at both periods above considered; and that the effects of the perturbing causes mentioned above, although shewn to be contrary in direction at the two periods, were equal in magnitude: and of these assumptions, the most natural and legitimate which

which can be made, let the consequence be sought. Calling here the rate per cent. by which the annual increase or decrease of prices, actually varied in peace and war, in each of the two periods, its *measure of variation*; it follows, that in the first period (the perturbing cause then in operation tending to counteract the effect of war) 1*l.* 1*s.* 8*d.* the actual variation taking place, was the difference of the variations which each acting separately would have produced; but their combined effect having been to retard a fall of rates, that of the perturbing force was the greater of the two. In the second instance they acted in conjunction, retarding a rise of rates, and the measure of variation, 12*l.* 12*s.* 8*d.* per cent. was the sum of their effects. The measure of this effect of war therefore, retarding an increase or accelerating a fall of prices, being the smaller of the two, would be a variation equal to half the latter sum, diminished by half the former, or (6*l.* 6*s.* 4*d.* — 0*l.* 10*s.* 10*d.*) 5*l.* 15*s.* 6*d.* and at this rate per cent. in the pound, on the assumption made above, it would have increased the fall of prices in the first term, if it had not been counteracted; and diminished the fall no more in the second, if it had not been aided by perturbing causes; such as differences of annual product from the average quantity, and some others.

The measure of the perturbing cause, equal at both

both times in magnitude, being the greater of the two operating forces, was equal to half the sum of the observed variations, or 6*l.* 17*s.* 2*d.* per cent. And hence the truth of the deduction may be proved: for the variation of the annual decrement in war in the first period, was equal to the difference of the measures here found, 6*l.* 17*s.* 2*d.* and 5*l.* 15*s.* 6*d.*; or 1*l.* 1*s.* 8*d.*: and in the second to their sum, 12*l.* 12*s.* 8*d.* per cent.

And by section 4th it was shewn, from the rates of 105 years, that the average price of wheat, in every peace, exceeds that of the preceding war, by 5*l.* 8*s.* 8½*d.* per cent.; very nearly equal to 5*l.* 15*s.* 6*d.*, the measure of the effect of war, thus found to assist the fall, or counteract the increase of prices.

It will be objected, that this consequence holds only on the assumption of a single case; that the measures of the effect of the perturbing causes were equal: and that the probability is very little, that they were actually so proportioned at the two periods. To this it may be replied, that thus much is proved hereby, that even the seeming irregularities in the table, when combined, give a result reconcileable to what is said of the tendency of war, by making use of an assumption, the most customary and obvious; and therefore no argument against it results from them. But this assumption

tion of the equality of the perturbing causes at the two periods, it must be further urged, is not necessary to obtain probable results: they might have been taken unequal; as for example, let the measure of that of the first period have been 8*l.* 15*s.* 7*d.* and of the second, 4*l.* 18*s.* 9*d.* *per cent.* From either of these it follows, that the depressing power of war was 7*l.* 13*s.* 11*d.* *per cent.* the rate found by the tables, as that by which the price of wheat in a year of war, would have been exceeded by the rate of the market, if the preceding peace had been continued to that term: and it is only necessary, that the measure of the effect of the first perturbing cause be taken at more than 1*l.* 1*s.* 8*d.* and less than 12*l.* 12*s.* 8*d.* *per cent.* in order to obtain a series of other results, alike consistent with what is said of this tendency of war. Within these limits, the assumptions which may be made are in number infinite; and the measures of the two powers may be taken in any possible proportion between the numbers 261 and 1879.

S. E. C.

SECTION VII.

*On the decrease of the Price of the Quarter of Wheat to the War of 1740, and its subsequent advance; and on their Magnitudes.*

THE original table contains the prices of wheat for 105 years: that period is apparently divided into two great parts, hitherto unconsidered. In the first the price of wheat was decreasing: and as the nature of the subject determined it, with an undulating diminution. In the second part, it appears to have become reaugmented in a manner the converse of the former: a division, the consequences of which deserve attention.

The prices of wheat in the years 1743 and 1744 are the lowest in the whole table: and if we respect intirely entries of single years, we must fix the minimum, or lowest price of the period comprized in it, between them; and at the end of the former year. But the rates of single years are too much affected by seasons and other accidents of the market, to fix from them the boundaries of great periods; and recourse must be had to the more accurate method of interpolation, which has before been applied to the subject. From the inspection of the table it is evident, that the lowest price

D 2

price took place, in some one year, between the middle of the second peace and that of the third; two terms of time distant twenty one years: the prices of which are determined from those of thirty-three years given. And from these, and that of the intermediate war, this minimum or lowest price, and its period, are to be assigned; which will be thus determined from the prices of forty-two years. And in so long a period, the anomalies of the market, arising from the singular scarcity or abundance of particular years, and such other causes as accidentally depress or raise its rates; being probably equally mixed, will counterbalance and destroy each other; and thus the results obtained will approximate nearly enough to those which would have been found, if the permanent causes of the progressive variations had operated without disturbance.

The middle of the year 1726, (or 1725½) was that of the second peace; the duration of the second half was thirteen years and a half; and the price of wheat at that time was 484*d.* the quarter: the following war lasted nine years; the price at the middle instant whereof was 425*d.* and its distance from that of the first peace eighteen years: there remained of the term four years and a half; and the half of the next or third peace was three years; the distance between which, and the middle of the preceding war, was seven years and a half. And the price

price of wheat at the end of the third year of peace, was 458*d.* pence. Now with these elements proceeding as before, the price for every term of the whole period of twenty-five years and a half will be found: and when 14.4 years of this period were expired, the price of wheat, according to the equation of the term, was fallen to 421*d.* or 1*l.* 15*s.* 1*d.* per quarter; the lowest rate or minimum thereof (1). Hence, whatever rates are seen in the table below that minimum; their depression is to be attributed to the variations of the seasons and markets from their average state: and the lowest depression of the market, is most truly to be taken to have been at the end of the year 1740 (1739.9).

And, if the whole period of 105 years comprised in the table, be divided into two equal parts; the division will fall in the middle of the year 1740, being extremely near to the term of the lowest price assigned above. Therefore as all other considerations set aside, this division into equal periods is familiarized to us by custom, and approaches very near to that which is most accurate, it is here exclusively followed: no further regard being paid, either to the true instant of the minimum by interpolation, or that exhibited by the original table.

This being taken as a proper division of the period, the variation of its prices shall be now examined; first by comparing the average of the

two equal terms it contains ; and secondly, the celerity of the fall of the first, and that of the advance taking place in the second.

The number of years contained in the table to the end of the last peace are 105 ; the sum of the first fifty-two prices, with the half of the fifty-third, or that of the year 1740, 1*l.* 5*s.* 4*d.* is 116*l.* 7*s.* and the average of the term, being of fifty-two years and a half, 2*l.* 4*s.* 3*d.* The like sum of the prices of the last fifty-two years and a half, is 112*l.* 10*s.* 1*d.* and the average 2*l.* 2*s.* 10*d.* Whence the average price of wheat in the first term exceeded that of the last, by 1*s.* 5*d.* the quarter ; and by 3*l.* 6*s.* 1*d.* per cent.

The celerity of the fall in the first term, and of the advance in the second, is thus found. The price of wheat in the middle of the war of the revolution, or at the end of the year 1692, was the average of that term, 2*l.* 10*s.* 8*d.* In forty-seven years and a half after, or in the middle of the year 1740, it fell to its lowest rate : but this is to be determined, not from the actual price of the year, but that found for it by the interpolation of three terms of peace and war, each of considerable duration, which is thus to be taken as 1*l.* 15*s.* 1*d.* the amount of the minimum determined by another mode above. The total fall therefore in forty-seven years and a half, was 15*s.* 7*d.* and the annual average decrement of prices 3.936*d.* In the middle

middle of the last peace, or at the end of the year 1787, the price of wheat per quarter was 2*l.* 6*s.* 2*d.* the augment was 11*s.* 1*d.* and the term in which it was generated forty-seven years and a half : whence the mean annual augment of prices was 2.8*d.* and the annual fall of prices in the first term, exceeded the advance in the second, by 40*l.* 11*s.* 5*d.* per cent (κ).

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SECTION VIII.

*On the Causes of this fall of the Markets, and of their subsequent advance ; and on some of their consequences.*

THE measures of this advance and fall of the price of wheat having been assigned, in conclusion some observations on the causes and effects thereof will be given. Dr. Adam Smith considers the decrement of the first period, as a proof of an increase of the value of the precious metals commencing long before the revolution. Nor is this inconsistent, as it may be at first suspected, with a fact which must be admitted, some increase of the national coin during the whole period of the fall : for if the national product had been increased in that period

with greater celerity, prices must fall, or the value of coin increase; in the same manner, and for the same reason, as a like increase of the value of money and fall of prices must take place; if the product were to remain unincreased, while the quantity of coin is diminished: for in both cases alike, a relative decrease, a decrement of the proportion of money to commodities takes place: and the variation of prices depends on the variation of the proportion, not of the absolute quantity of each.

It is also to be observed, that after the quantity of the precious metals annually imported has been for a course of years fixed; the latter imports may increase the stock of money in the general market of Europe very little. For that stock being toward the end of the term considerably increased, its waste by wear will also be increased in the same proportion; together with its diminution by accidents; as casual losses, fires, and shipwrecks. Some coin is melted down, and together with much bullion wasted by the arts: and the diminution in the last mode will be perpetually increasing, by the relative fall of the price of the metals, compared with that of every other thing. Moreover from the revolution to the year 1740, the bullion exported to China and India, from Britain and the rest of Europe, was annually augmenting; and it has been well observed, that the Europeans dig silver in the West, to carry it to be buried in the East. Hence even the increase

crease of the quantity of coin in a state, might go on with a celerity perpetually retarded, until it ultimately ceased; although its imports of the precious metals were every year equal.

Thus, equal quantities of bullion dug from the mines, will increase the European stock of coin by an annual augment perpetually decreasing. But if it all were converted into money, not subject to wear, exportation, or accidental loss; the annual increase of the stock being perpetually equal in amount, its increase *per cent.* would be perpetually diminished: and the truth of this position may be very easily shown. Montesquieu says, that by the discovery of America, the stock of money was increased in two centuries, in the proportion of thirty-two to unity\*; and he considers this to have been effected by equal annual imports; which consequently amounted to 16*ℓ.* *per cent.* of the initial stock annually. This seems too great an increase, even for an assumption to illustrate this proposition. Let it therefore for that purpose be supposed, that the average annual import has been  $\frac{1}{20}$  or 5*ℓ.* *per cent.* of the initial European stock of coin: and that this influx commenced with the conquest of Peru, in the year 1532: then the constant annual augment being taken as five, and the original stock of coins as 100, it must have been as follows:

\* *Esprit des Loix*, l. 21. c. 22.

In the Years	{	0	20	40	60	80	100
		1532	1552	1572	1592	1612	1632
Stock of Coins, as	{	100	200	300	400	500	600
Ann. aug. per cent.	{	£.5	2.5	1.666	1.25	1.000	0.833

Thus the ratio of the increase to the stock will be perpetually diminishing, and at first rapidly: it is only when that proportion becomes very minute, that the annual augment *per cent.* approaches to equality. But there are two causes which will stop that augment altogether: First, the decrease of coin by wear, casualties and the export to the east, which jointly may be taken at a fixed rate *per centum* of its whole amount: let the yearly aggregate of all these be only  $\frac{1}{2}$  £. *per cent.* of the whole coin; the ratios of the annual augments to the stock in the successive periods, are the terms of the reciprocal series,  $\frac{5}{1}, \frac{5}{2}, \frac{5}{3}, \frac{5}{4}$  £. &c. *per cent.* the tenth term of which is  $\frac{5}{10}$  £. or one half *per cent.* Thus the annual augment of the coin will ultimately become equal to its annual decrease: and the final stock will be as 1,100 or eleven times the initial stock. An event which would by this hypothesis for illustration, have taken place in 200 years after the conquest of Peru, or in the Year 1732.

But there are causes both accelerating and retarding this period. Among the accelerating causes, one of the most powerful is, the increase of the

stock of metal itself: and if the quantity of commodities to be purchased by it, continue fixed or increase in a less proportion than coin; the real value for which this universal equivalent will exchange, will perpetually diminish. And the stock of money, compared with commodities, will probably increase with as great celerity in the country of the mines, by what is retained for its use, as in Europe: and if Dr. Smith had been followed here, it might be affirmed, with greater. Thus the charge of working the mines will increase, and even the undertaker's remainder thus diminished be reduced in proportional value to him; and if at first the share of the miner, after paying the king's tax, were eight times the charge of procuring the metal; and prices rose as in Europe; after eight periods of twenty years, the expence of working a mine becoming eight times as much, would equal his share of the product; the tax being here constantly taken to continue unreduced. And the quantity of his surplus would be in each successive period, 7, 6, 5, 4, 3, 2, 1, 0 eighths of the excess of the product above the tax. But the value of the metals falling, as the terms of the reciprocal series  $1, \frac{1}{2}, \frac{1}{3},$  &c. the value of his surplus, or the quantity of commodities it will procure him, will in the successive terms be as those of the series,  $\frac{7}{1}, \frac{6}{2}, \frac{5}{3}, \frac{4}{4}, \frac{3}{5}, \frac{2}{6}, \frac{1}{7}, \frac{0}{8}$ : And the working of the mines must be abandoned, long before the

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the end of the term; but if the advance of prices in America, constantly follow that of Europe at a certain distance, as twenty or thirty years; the period of working the mines will be protracted so much longer.

But there are causes also retarding this term: the total quantity of gold to be divided between the king and the adventurer remaining the same, whatever increases the share of the latter, diminishes the charge of extracting it, or makes it absolutely of greater value to him, will encourage him to continue his undertaking. Reductions of the king's tax are of the first kind; improvements in the process of the extraction of the metals are of the second; and an increase of the product of other branches of industry, and principally such improvements, as procure greater products from the same quantity of labour, are of the last. And these may go on for many years, at particular periods; so that the general quantity of products shall increase with greater celerity than that of coin, although constantly augmented: thus the latter will rise again in its value; and the share of the proprietor of the mine, though not increased, become more valuable to him.

And to the miner, the ultimate effects of each of these are alike; but they are very different on the prices of commodities. The last reduces them; the two first by sudden augmentations of the

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the profits of mining, enable former adventurers to increase their undertakings, and attract new capital to new ones; increasing the product of the metals, and accelerating the fall of money.

Since the discovery of America, the product of the mines has generally increased with more celerity, than that of the products of Europe: whence on the whole, there has been a great increase of prices. There may also have been periods, in which such products have increased fastest: the proportion of the augments of each has also frequently varied: so that the line describing the fall of the value of money will be undulated, and even have some points of retrogression.

But, as explained above, while the quantity of coin in a state absolutely increases, if its product be augmented with greater celerity, it relatively falls, and the price of corn with it. This was our state from 1688 to 1740: and the fall is accounted for on the same principle by Dr. A. Smith, although he takes it as terminating later. But an increase of the produce of the mines will raise again the rates of the market, and they will continue rising, until the annual import of the metals, supposed again uniform but of a greater amount, shall have produced its utmost effect.

It is to such an augmentation, which was not heeded by that writer, that the increase of the price



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price of wheat during the latter half of the term here considered, is to be attributed.

The history of this event, from the facts I have been able to collect, is as follows.\* In the year 1723, the court of Spain determined to reduce the duties paid on the precious metals, at the mint of Goanaxuato in Mexico. They probably had imagined, that by a reduction of the duties, the increase of the quantity would be such, as even to produce a considerable increase of the revenue. The quantity of the gold and silver brought annually to this mint, was, on an average of sixty-five years before the experiment, in value 193,103*l.* sterling. It was therefore sufficient for a trial of the measure upon an adequate scale, and that with little hazard to the general amount of the tax on the mines. The aggregate duties on gold bullion were then reduced from  $22\frac{7}{10}$  to  $12\frac{3}{4}$  per cent; and on the silver in ingots, from 20 and 22 per cent, to a rate varying from  $12\frac{7}{8}$  to  $10\frac{9}{10}$  per cent, at different periods.

In Doddsley's annual register of the year 1783, there is a table shewing the weight of gold and silver, on which duties have been paid, by the accounts made up every five years, from 1665 to 1778 each inclusive, being an abstract of the King's books at the mint. This

\* Doddsley's Annual Register, 1783, part 3, p. 165, 166.

table

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table has all the appearance of being an official paper; it is signed "Juan Ordonez, keeper of the records." From it the following is calculated.

	Fine	Rials	s.	d.	Ys	Product	Ys	Product
Gold, Castellans	22 carats	20 $\frac{1}{2}$	11	6 $\frac{3}{4}$	65	541,964	49	3,005,927
Silver, Marks	12 dwts	69 $\frac{3}{4}$	39	3 $\frac{7}{8}$	65	6,222,297	49	15,471,791

Whence the following averages are deduced:

	1st term	2d term	1st do. <i>l. st.</i>	2d do. <i>l. st.</i>
Gold, Castellans	8,337	61,344	5,003	36,815
Silver, Marks,	95,726	315,730	188,100	620,610
Total <i>l. sterling</i>			193,103	657,425

The yearly average of the metals in the first period having been 193,103*l.* and of the second 657,425*l.* the increase was in the proportion of 340.45 to 100, or about  $240\frac{1}{2}$  per cent. Now the mean tax on each of the metals for the first period, may be well enough taken at  $21\frac{85}{100}$  per cent, and for the second at  $12\frac{47}{100}$ ; thus it appears in 1723 to have been reduced nearly in the ratio of 57 to 100: and the product of the duties in the first period was 42,192*l.* sterling, and in the second 81,980*l.* having been increased 94*l.* 6*s.* per cent.

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In the original table two columns are added under the titles of duties on silver and duties on gold: on a due comparison with the value of the metals for which these duties were paid, they are found both before and after the year 1723, to have been nearly at the equal rate of  $1\frac{1}{2}\%$  *per cent* on the total of that value. The columns are therefore the amount of the sovereignty duty mentioned in the memoir (L); a distinct payment from the greater taxes of the fifth and tenth of the amount; of which the table contains nothing.

The result of this operation determined the crown of Spain to extend the reduction of the duty to all the mints of America: for we find, that the tax upon silver in Peru, was in the year 1736 reduced from one fifth to one tenth of the metals extracted\*. This measure must have produced great effects on the quantity of the annual product: for those who before entered the product of their mines legally, must certainly then have derived some profit from them: its rate was now increased  $10\%$  *per cent*; and they extended and multiplied their adventures. There must likewise have been a numerous class of men in those colonies, whom the legal gain could not before induce to embark in the search and

\* Wealth of Nations, v. i. p. 315.

working

working of mines, and who would not run the smugglers' hazard; whom this great addition to the regular profits of mining, induced to embark in it. The additional product of the adventurers of the first class, and the intire product of that of the second, is a real augmentation of the metals dug up every year; a great part of which must have increased the European import.

The augmentation however cannot be equal to that of the quantity paying duty: part will be retained in America for the use of the colonists: and many engaged in the clandestine trade, when the superiority of its profits were diminished  $\frac{1}{10}\%$  *per cent*, must have declined the hazard of continuing it, and brought their gold and silver to the mints according to law. But their works, before clandestinely carried on, being now openly wrought, would be continued on a larger scale: and here an absolute increase of product would be obtained. Yet still the remaining tax of  $\frac{1}{10}\%$  *per cent*, might operate with considerable power, and much gold and silver would continue to be smuggled. And hence it is to be concluded, that the reduction of the tax in Peru, had consequences similar to those, which followed the previous adoption of that measure at Goanaxuato; although the augmentation of the metals paying duty, might fall in some proportion which

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cannot

cannot be assigned, below that which followed the reduction of 1723.\*

In four years after the diminution of the tax in Peru, which took place in 1736; or closely adhering to the yearly prices in the first corn table, in seven years and a half; the augmented import of the metals began to produce its natural effect in our corn market; and continued to augment its prices, until it had raised them, to the highest rate the new annual supply of the metals could support. This took place about the beginning of 1769, according to the first table.

In the first half of the term comprised therein, the improvements in agriculture and its product being progressive, the demand for the precious metals was increasing; the annual supply being fixed, or perhaps decreasing from its nature, as explained above. Hence the price of corn fell, but that annual supply rising *per saltum* in 1736, with greater celerity than the products of agriculture, the value of the metals must have begun to fall. The justice of this principle is recognized by

\* The Portuguese do not seem either to have anticipated or copied this great measure. In 1761, the tax on the mines of the Brazils was one fifth of the metal extracted. Account of the European settlements, probably written by Mr. William Burke, 5th edit. 1770, p. 313.

Smith.

Smith\*. He also repeatedly mentions the reduction of the duties upon gold and silver in 1736. But he enters into no inquiry into the effect of that measure, upon the annual supply of Europe: and when he comes to consider the prices of corn, from 1688 to the peace of 1763, and the import of the metals conjointly; he all along proceeds upon an assumption tacitly made, that this import continued uniform. This led him to attribute the rise of prices actually commencing about 1740, and continued according to his tables to the year 1764, to a succession of indifferent or bad seasons †; not for ten or twelve years, but for twenty-four; a circumstance not to be lightly admitted. But as the prices of corn were supported, at a rate not much inferior to what it had risen to, to the end of the last peace, or for a further term of twenty-eight years; and the continuance of the effect, must arise from the continuance of the same cause; the error of his account of that rise of the corn market, is now, much more obvious, than at the time of his writing.

To conclude these remarks on the cause of the rise of market rates, after the year 1740. By the table, of the accounts of the mint of Goanaxuato, it appears, that the entire success of the operation of

\* Wealth of Nations, v. i, p. 275.  
† Wealth of Nations, v. i, p. 310.

1736, had induced the court of Spain in September 1777, to try what would be the effect of reducing the duties on gold and silver still further. That on gold bullion was lowered from  $12\frac{2}{3}$  to three *per cent*; and the seignorage taken off silver. The quantity of both, on which the duties were paid, is given in the last article of the table, for four years only, ending with 1778; including  $2\frac{1}{2}$  years at the old, and five quarters at the reduced rates. And as far as any consequences can be drawn from the experience of so short a period, the increase of the product of the mines by this second measure, may be expected nearly to equal that of the first (M): for there is little probability that in the following years it became less effective. This second experiment had undoubtedly the same object as the first; and if it succeeded, it must be inferred, it was in like manner copied in Peru, in some period of the last peace. This soon produced a second important augmentation of the Spanish import of the precious metals, which in five or six years again affected the corn market of Britain; and continuing its operation, is now a strong and concurring cause of the high prices of wheat in the present war. For the reduction of the tax on the metal in Peru, in 1736, is to be taken by the table, to have produced its utmost effect in the wheat market, about the middle of the peace

of

of 1763; or the year 1768, or in thirty-two years.

But Robertson, in his History of America, has pointed out another probable source of the increase of the influx of gold and silver into Europe, "but little known" to us at the time of his writing; and of which he says, it "may be productive of great effects;" and that "it merits attention;" and it certainly merits it here. In the year 1765, the Spaniards, engaged in a war with the Indians on the borders of Mexico, were led into the mountainous districts of the province of Sonora; and "in the course of this service, marched through countries into which they seem not to have penetrated before that time, and discovered mines of such value, as was astonishing even to men acquainted with the riches contained in the mountains of the new world. At Cineguilla, in that province, they entered a plain of fourteen leagues in extent, in which they found gold in grains at the depth of only sixteen inches, of such a size that some of them weighed nine marks, and in such quantities, that in a short time, with a few labourers, they collected a thousand marks of gold in grains, even without taking time to wash the earth that had been dug, which appeared to be so rich, that persons of skill computed that it might yield what would be equal in value to a million of Pezos (N). Before the end of the year 1771,

“above two thousand persons were settled there, under the government of proper magistrates.” He adds, “as several other mines, not inferior in riches, have been discovered both in Sonora and Cinaloa, it is probable, that these neglected and thinly-inhabited provinces, may soon become as populous and valuable, as any part of the Spanish empire in America\*.” It is evident, that the great effects Robertson had in contemplation when he wrote, were those of a future fall of the value of money: which the experience of above a century, shows to be more manifested by the increase of the rates of the wheat market in peace than in war, the product of the year being equal in each; be it either deficient; of the average quantity; or even abundant.

But to what has been said of the increase of the European import of the metals, one objection will be urged. It appears by the evidence of Sir John Hort, who had many years been his Majesty’s consul at Lisbon, which was delivered before the Lords’ Committee, on the stoppage of payments in cash at the Bank, that “the raw articles of the Brazils have been greatly increased of late years, and consequently, that considerable sums of gold have been sent back to that country from Portugal, in payment of its debts and balances.

\* History of America, v. iii, p. 262, 8vo, 3d edit.

“ This

“ This naturally, (he observes,) should diminish the import of gold into Portugal, *but of this fact*, (he adds,) *he is not informed.*”

Yet it will be seen that this leaves it intirely uncertain whether the quantity of the metals from the Portuguese mines, resting in Europe, be increased or diminished. For by his evidence it appears, that in his opinion, the annual import of the metals is also increased. “Some of the mines, he informed the committee, are understood to have decayed in their produce, but *new ones to a considerable amount* have been opened.” And on the whole he concludes, “the importation of gold from Brazil to Portugal\* to have been *at least equal* to what it has been for many years.”

This mode of speaking admits an increase to be most probable, but suggests nothing as to its magnitude. And beside it appears by the same evidence, that the total “quantity is kept secret, and has been particularly so for some years past.”

It does not follow from this, that even the increase of the import of bullion does not exceed that of the adverse balance of the export of commodities, if such a balance have taken place; and consequently not that it equals the former; or much less that it considerably exceeds it; which latter must be affirmed, or the objection, if allowed, is of little weight. From this evidence it cannot there-

\* Report, p. 101.

fore be maintained, that the yearly resting balance in Portugal is decreased. And that of Mr. Whitmore, the principal part of whose transactions had been remittances from Portugal in coin and bullion for twenty-five years, leaves the matter in the same uncertainty. He states himself to have "reason to believe that coin has gone back from Portugal to the Brazils; but declares he can say nothing as to the quantity imported\*."

It is moreover to be observed, that the reflux of coin into the Brazils, is not a legitimate proof of the overbalance of its commodities against Portugal, in the case stated to obtain: for (if it exist) it depends upon circumstances, from which the same effect must follow likewise in the opposite case. While the bullion coming annually from Brazil exceeds the value of the coin returned, which is here admitted; no such return would take place, unless the exertions of the two provincial mints of Rio Janeiro and the bay of All Saints, were totally inadequate to the commerce of the colony; or no proper exchange, were established between it and the mother country; whereby the export of a great and superfluous quantity of bullion by the former, and of coin by the latter the following year, must take place: when the business might have been done by the simple

\* Report, p. 105.  
 † Hist. Philos. et Pol. Raynal, v. iii, 409, edit. 1770, Amst. transit

transit of the difference. This bringing of gold across the Atlantic, and sending it back again in the shape of coin, is only a proof that the debts on both sides are liquidated in a bad manner; but not that the annual balance is either increasing or decreasing. And there is some reason to conjecture a stop has been put to the mints in the Brazils: for it appears, coin was formerly imported into Portugal from them\*: but at present, we have the testimony of Sir John Hort, that gold comes over only in bars and dust †. And as a reason why the import of coin was lessened, Mr. Whitmore alledged, that all the gold passed through the *King's mint* ‡: by which it is to be naturally understood, not the provincial mints, but that of the mother country. Now Smith observes, that the greatest customers for the new coin of American gold, are the inhabitants of the gold colonies: if Portugal therefore undertook to supply her own, she of necessity was obliged to begin to export it to them; but at the same time, her own import was increased by the metal formerly coined in her settlements. And the recently flourishing state of the Brazils, proved by the increase of its commodities, has probably drawn the magnitude of this reflux of gold more distinctly into notice.

\* Report, p. 105. † Ib. p. 103.  
 ‡ Ib. p. 105.

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In fine, a considerable increase of the balance of the value of commodities, in the trade between Portuguese America and Europe, may be admitted in favor of the former, and even some diminution of its export of gold; yet it will not nearly equal the probable increase of the European import of bullion from Spanish America.

Other causes have concurred to render this calamity of the weight we feel it to be: the desolation which the incursions of France have spread over the finest provinces of Flanders, Germany, and Italy, have greatly diminished their product: and instead of our being able to draw any supplies from them to relieve our necessities, they most probably themselves are obliged to sacrifice some part of the remainder of the specie or effects rapine has left them, for their own supply: and they are become competitors with us in other foreign markets to a certain degree. The distresses of Naples will call for most of the corn the known fertility of Sicily can spare: nor are the ravages of Egypt and Syria, without their circuitous consequences.

The last calamities of Poland deprived us of much of the succour, we might have derived from thence to alleviate the burthen we labour under: and they far exceeded those produced by its first internal commotions, to which Dr. A. Smith ascribed considerable effect in our corn market. If our protection and that of Prussia could have been

been continued to the soberly ameliorated constitution of that country, it might have been now so far recovered, as to have become in this hour of our necessity, the granary of Britain, as it has formerly been of Europe. But for that protection the junction of both those great powers was necessary. The criminal intrigues of an individual raised an impolitic clamour against this junction at home: by his known agent abroad, he opposed and in part defeated the negociations of his country. Thus by a treachery to his unconscious party, of which he was the ostensible leader in a certain assembly, he exposed them to the hazard of the reproach of becoming a Russian faction there, and of having lowered themselves to the level of Swedish pensioners of that power; he delivered over the unfortunate kingdom, to the swords of the deposed and the foreign enemies of its king; and destroyed the ample and broad foundation of a mound which political wisdom had laid, and must have completed, to stop a new deluge from the North, perpetually threatening to overflow all Europe. For Prussia disgraced, injured, and irritated, by this forced desertion of the British government, and not over solicitous of the justice of the means whereby it should gratify its resentment, and indemnify itself for its past expences incurred, joined ultimately to destroy that constitution, the establishment of which it had so much promoted, and to divide the unhappy kingdom

kingdom with its former antagonist. A considerable part of a nation seldom falls into great political errors, without experiencing the bad effect of them in some shape: our ungrounded clamours against the Russian armament, contributed to dissolve our connection with Prussia, to make Poland the scene of new revolutions, and at last to deliver her to the dominion of foreign conquerors: the devastations which then laid that country waste, which had been much harrassed and afflicted before, render it totally unable to be of any considerable aid to us, in the present season of our distress for corn.

Among the consequences of the fall of prices, which has been shewn to have continued for half a century, there is one which is of weight enough at this crisis to deserve to be entered into. Until the year 1765 we had a great export trade of corn; since the year 1771 a constant import has been necessary for our supply\*; in the interval, the balance of import and export may be supposed to have been fluctuating.

Two causes may be assigned for this; the first of which shall be barely stated, without entering into any discussion upon it. Although the number of the inhabitants of the villages be increased, together with their skill in agriculture, whereby its product is considerably augmented; yet it appears

\* Hodson's Sermon, Appendix, p. 29.

evident, that our manufactures and manufacturers, who are here to be taken only as consumers thereof, have increased with greater celerity: thus the product of the country is not so great as formerly, in proportion to the number of persons to subsist upon it.

The second is, that a greater consumption of wheat has taken place, by equal numbers of the lower class, in the latter period than the former. This may be shewn to be in the highest degree probable, from the prices of the table to the end of the war of 1740. For, from the beginning to the end of that term, which considerably exceeded half a century, some advance, and that not inconsiderable, was made in the wages of artizans and labourers in husbandry. But if, contrary to all testimony, and the reason of the thing, we suppose them to have for that term remained fixed, the effect of this long fall of prices would be the same in kind, but inferior in degree only.

While the price of the grain reputed the best for bread, was decreasing in every period, and the weekly income of the lower class, who had before very much subsisted on substitutes for it, was increasing, or even remaining fixed; it is natural to suppose that they would desert the use of the latter, or at least greatly diminish it, and indulge themselves in that of the former in its stead. At the conclusion of the last and the beginning of the present century, a mixture of rye or barley with wheat



wheat was very common in the bread of the lower class: the former was called maslin. Houghton, in his collections on trade and husbandry \*, informs us, that barley bread was in such general use in some parts of England, that of seventeen quarters of corn ground weekly, at a mill in one parish in Buckinghamshire, sixteen were of barley: and in Wales, that a bread had been long in use, made of equal weights of wheat meal and of boiled turnips, the juice being pressed out of them. That bread intirely of wheat was not much eaten by the poor, may be also inferred, from what he says of that which was made of wheat meal, with the coarse bran sifted out. " This sort," he informs us, " is chiefly in the country, among able folk, that do value good bread."

But the principal grain used in making bread, together with wheat or by itself was rye. In the year 1688, Mr. King computed the quantity of wheat grown for consumption at fourteen millions of bushels; and of rye at ten millions †. Thus taking the consumption to have been as the product, the wheat was only  $\frac{593}{1000}$  of the bread corn consumed: but previous to the year 1772, the author of the Political Essays on the British Empire, informs us, that the consumption of wheat had been encreased to 3,840,000, while that of rye

\* Vol. I. No. 90, April 20, 1694.

† Whitworth's Davenant, Vol. II. p. 216.

had

had been diminished to 1,030,000 quarters \*: there fore the consumption of wheat was now become  $\frac{788}{1666}$  of the whole of our bread corn; or the average consumption of wheat per head, was now increased in the proportion of 788 to 583; or that of four to three nearly. This circumstance, joined to the relative increase of our artizans and manufacturers, has chiefly contributed to change our export trade of wheat, into an import. The use of the inferior corns in bread is now confined to a narrow district; continually encroached upon and diminishing, by the borderers falling into the intire use of wheat.

The state of the labourer in every department, must have been extremely easy in the first of the terms, that of the fall of prices, ending in the war of 1740. This brought on an augmentation of their indulgences, in the use of wheat for rye; which becoming customary in certain parts of the kingdom, now became to be reputed at least as a necessary. This was not the only one of which they contracted such fixed habits, that it became such; others might be mentioned. When the price of wheat and other commodities began to rise greatly, great additions in the poor's rate took place on those two accounts jointly (o). This consequence of what has been said, is of too much general importance to have been passed by un-

\* P. 97, 98. Account of Wheat from the three tracts on the Corn Trade; that of Rye probably from the same writer.

noticed,

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noticed, but not enough connected with the subject to dilate any further upon it.

In the latter part of the second period, as it has been before stated, it had become permanently necessary to import corn in war and peace. The first war in which this necessity took place was that of 1775: it may be by some contended, that this necessity will raise the war prices above those of peace. On this subject one party will argue thus: 'when we carry on an export trade in war, our wheat must in the foreign market pay the home prices, freight and mercantile profit, with the addition of insurance against captures: which last addition tends to render it in war too dear for foreign markets. Thus our superabundance is kept at home, and the prices fall. But when we carry on an import trade in war, the insurance being added to the import price, the effect of the import to keep down the price of our own product is diminished, and an increase of them takes place.'

This conclusion holds good only, as to that part of the corn not imported in neutral bottoms, but in our own vessels, sailing without convoy; which was much more frequent in the last war, than now since the convoy tax. It also implies that the nations with which we are at war, carry on neither an export or import trade in corn. For in that case, there will be corn ships taken on both sides; and the

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the balance of captures of such vessels is to be considered. And being most powerful at sea that balance will be in our favour, and counteract the effect of the insurance. But this insurance, and the balance of captures, are only opposite articles of account, the specific amount of which cannot be annexed to either; and consequently it cannot be known which side exceeds the other. This is capable of being determined only one way, by a comparison of the prices of corn, in wars during which we subsisted in part by wheat imported; with those of the terms of peace preceding and following them, in which the same necessity took place. Only one such instance has occurred: if the basis of the conclusion be narrow, it is the widest on which any can legitimately be founded: and the circumstances of it go as far as possible, to compensate for its being a single instance only. In the war of 1775, we were engaged against four powers; and, as far as the capture of corn vessels only is concerned, they were naval powers: for by the knowledge the American sailors possessed of our coasts, their privateers which were numerous, were in proportion to their numbers more formidable than those of any one of our other three enemies: while the royal navy, which gallantly, but with unequal force, supported a difficult defensive against the fleets of France, Holland, and Spain, united, could not be applied,

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as usual, to scour the seas of these little predatory cruisers: a duty which it now performs with so much effect; while the protection it gives to the corn trade, among others, goes so far beyond all former example.

It remains to examine what effect this accumulation of adverse circumstances tending to increase the insurance, and to turn a favourable into an adverse balance of captures of corn ships, produced. The average price of wheat during the peace of 1763, was 2*l.* 9*s.* 5*d.* and of the following war, 2*l.* 1*s.* 11*d.* per quarter: the price of the preceding peace therefore exceeded that of war, by the very high rate of 17*l.* 17*s.* 10*d.* per cent. The constant importation is here taken to commence with the peace; in fact it has continued only for thirty-two years to the present time, for which "we have the undoubted authority of Lord Liverpoole\*." It therefore commenced with the year 1768, the seventh before the commencement of the war: and the average price of wheat for those years was 2*l.* 10*s.* 11*d.* per quarter; exceeding that of the following war by 21*l.* 9*s.* 5*d.* per cent. The necessity of importation was indicated by the rise of prices, and it was so demonstrated to take place *at first*, in the middle of a term of peace.

\* Hodson's Sermon, Appendix, p. 29.

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The price of corn after having fallen in the first war, during which we were under a necessity of importing it, to 2*l.* 1*s.* 11*d.* as above; rose again in the following peace to 2*l.* 6*s.* 2*d.* the average of the term: or 10*l.* 2*s.* 9*d.*  $\frac{1}{2}$  per cent. If therefore a nation is subsisted in part by corn imported, this example shows that a war, of which every circumstance seemed to tend to increase the insurance to the utmost, did notwithstanding greatly reduce the price.

From what is stated the conclusion is, that the effect of war is to reduce the price of wheat; and it is probable, by parity of reason, that of all the prime necessaries of life which are not directly taxed. And that the prices of wheat have exhibited in the time of no war any appearance of being affected by the circuitous effect of any taxes it has brought upon us\*. And it will hardly be alledged that there is any thing in the nature or circumstances of the present war, so far differing from all preceding wars since the abdication, as to render its effect diametrically opposite to all such, or make it tend to advance prices. The true causes of the melancholy state of the market are a deficiency of the product of last year, (p) joined perhaps to some others; among which must be reckoned that spirit

\* Our taxes increased rapidly in the first century after the revolution; the price of wheat fell in the same manner; this indicates that taxes imposed in war, have no effect on it in the following peace. (See Note A.)

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of speculation, seasons favourable to its effects never fail to excite. Whether its system has not received great improvements, its combinations become more extensive, and its spirit more keen, are inquiries not purposed to be entered upon.

There are a set of persons, it must be here in conclusion added, who have lately considered it as matter of no small criminality, to urge any arguments which may be employed afterwards as topics to defend the continuance of war, *in any case*. Peace considered in the abstract is preferable to war. But if any one should now, with Erasmus \*, have the temerity to deny this; before it could be shown to be true, it would be necessary accurately to enumerate what are the leading consequences of both. No falsity in that enumeration, can afford a legitimate basis of an argument for this truth: we have the experience of above a century to demonstrate the gross error, of reckoning an augmentation of the price of corn among the consequences of war; and if we were involved in a war, ever so unjust and unnecessary, it would be betraying a good cause to argue for its being put an end to, from so false a position.

Admit now that it were true that war raises the rates of the corn market, what is that consequence thereof to society? a physical or natural evil. But

\* *Moriae encomion.*

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if the war a nation be engaged in be just and *necessary*, from the nature of necessity, that evil and the others incident to war would be overbalanced by different evils, but the same in kind, if we did not exert our strength by war to repel them. It is therefore, even in conjunction with others, in a just cause to be voluntarily submitted to, as the less of two evils.

But it is only one class of those who will censure the conclusion here deduced, to whom this is a reply. Others may say, that "arguments liable to be perverted into a recommendation of the state of war, ought not to be urged by the ministers of our church. That it is of little avail to admit in general terms the criminality of an unjust war, when among its consequences, a fall of the price of wheat is asserted to be one; it being an object which a great class of society always reckons among its first interests to secure." To this it is replied, that by parity of reasoning, if a moral writer or a preacher, in treating on some of the greater vices, were to admit that they in a certain shape, and under certain circumstances, promote a man's present interest, he might be reproached as favouring the extension of those vices. If it is here said that war reduces the price of wheat by a certain number of pence in the pound, or a certain rate *per cent*, the most applauded writers have said much more without reprehension. Has not

not a professor of moral philosophy in the university of Edinburgh, affirmed, that "it is in vain to expect that we can give to the multitude of a people a sense of union among themselves, without admitting hostility to those who oppose them. Could we at once, in the case of any nation, extinguish the emulation which is excited from abroad, we should probably break or weaken the bands of society at home, and close the busiest scenes of national occupations and virtue\*." Fuller citations might be brought from Lord Kaim; but there are on this point just exceptions against him, as an example: those however lie not against that excellent father of our church, the great Dr. Barrow, the precursor of Newton; who concludes the arguments of his sermon, on the proof of the being of God from the frame of human nature, with the following words. "I might consider the benefit that arises, as in the natural world from contrary qualities and motions, so in the humane world even from wars and contentions; how these rouse men from sloth, brush away divers vices, ferment and purge things into a better condition; but I will not strive to be so minute and sub-

\* Ferguson's History of Civil Society, Pt. 1, Section 4, Conclusion.

"tile."

"tile\*." Yet it is to be presumed, that for this declaration, he will not be accused as the advocate of unjust and unnecessary war; or censured for having violated, even the sanctity of that place where it was delivered.

\* Works published by Dr. Tillotson, vol. ii. page 112, Folio.

NOTES.

NOTES.

(A) THOSE who maintain the contrary appeal to experience; but they appeal to a tribunal which gives the cause against them with the most absolute decision. The table to be given hereafter shews a perpetual fall of the prices of corn to have taken place, from the revolution to the year 1744, interrupted only by the short peace of 1698: the price of corn having been 2*l.* 10*s.* 8*d.* in the former, and fallen to about one half, or to 1*l.* 4*s.* 10*d.* the quarter in the latter period; that is in the long term of fifty-six years. But in the same time our taxes, which in 1688 amounted to 2,001,855*l.* \*, had become increased to 5,628,973*l.*, compounded of the land and malt tax, those for the interest of the debt, and their surplus forming the sinking fund †. It was in the very year 1740, the most distinguished assertor of this circuitous effect of taxes, Sir Matthew Decker, published his celebrated essay; an extract of which on this head, a curiosity *sui generis*, may be found in Pofflethwayte's Dictionary ‡: although this notable discovery had been anticipated by a writer in the Craftsman about eight years before, who informs us, that "our taxes had already more than doubled the prices of the common necessaries of life §."

\* Davenant, Edit. 1771, vol. I. p. 20.      † J. Pofflethwayte's Hist. Rev. p. 217, 240.      ‡ Article, Duties.      § Sinclair's Hist. Rev. Appen- dix, p. 72.

After

After having seen, from the variation of prices in a period of fifty-six years, that taxes when nearly trebled, produce no effects on the prices of the necessaries of life escaping direct taxation; it will not be contended, that the advance which took place in the second period of the same length, is to be attributed to the increase of taxes taking place therein. Or if these reasoners from induction shall continue to maintain, that a variation of the prices of these articles must, in long periods, follow a variation of taxes; they must then admit them to have possessed a strong depressing power during the first period; and that at the end thereof their nature and effects were totally changed; and that they then raised the market nearly by the same rate, they had depressed it before.

(B) The prices are those of Windsor market. But a very material difference in the title of the tables of Smith and Hodson cannot be passed over. It is stated above that the quarter is of eight bushels: which seems confirmed by a copy of the same original account in M. Postlethwayte's Dictionary, ending with the year 1753. Smith expressly says it was of nine bushels. This was not an error of the press, he every where in his computations takes it at nine. The statement of Mr. H. is adhered to in the text, on a presumption that it is a just but tacit correction of an error which had crept into Dr. Smith's work, which was discovered by the author of the Corn tracts. But the evidence of this is not so complete as to preclude all regard to the authority of so celebrated a writer. As further evidence, to decide which is right, is not attainable by me, in the notes every computation is repeated, on the supposition that all the prices of the table, to the year 1765 inclusive, are

are of quarters of nine bushels; which therefore require to be reduced to eight the legal quarter by the deduction of one ninth of their amount. It is proper to add to this notice, that the conclusion derived from both the tables (for the variation in the title makes them effectively two) with respect to the effect of war on the price of corn is the same, that its tendency is to reduce it: although the measures of the effect deduced by each necessarily differ; that resulting from Dr. A. Smith's table, being on the whole somewhat greater.

(c) With the reductions directed to be made in note (B) to Section III, the table will stand thus.

	War	Y.	£.	s.	d.	Peace.	Y.	£.	s.	d.
I.	1688	10	2	5	0	1698	4	2	6	8
II.	1702	11	1	19	11	1713	27	1	15	10
III.	1740	9	1	11	6	1749	6	1	13	11
IV.	1755	8	1	17	2	1763	12	2	8	3
V.	1775	8	2	1	11	1783	10	2	6	2
Number of Terms		5	9	15	6			10	10	10
Great Averages -		1 19 1						2 2 2		

Here the mean of the average prices of the five war<sup>s</sup> is 1*l.* 19*s.* 1*d.*; and of the five terms of peace following them 2*l.* 2*s.* 2*d.*

The excess of the latter above the former is 6*l.* 12*s.* 2*d.* per cent: exceeding the rate 5*l.* 8*s.* 8½*d.* given in the text from Hodson's table.

Whence it appears, taking the price of wheat in a year of war at 6*l.* 6*s.* 0*d.* per quarter if peace had been concluded before that year, it would have amounted to 6*l.* 14*s.* 3¼*d.*: or its price would have been increased 8*s.* 3¼*d.*

In

In the year 1795, which was a year of great scarcity and much sedition, the above comparative table, continued to the end of the peace of 1763, with a slight comment on it, was inserted in one of the public papers, by a gentleman to whom I had communicated it for that purpose. The average of the last term was taken from a table of prices of wheat, from the books of the house of industry at Nacton in Suffolk; laid before Parliament; but the authority of Catherwood's tables is to be preferred to the former.

(D) With the reduction directed in note (B) the proportion of the price of wheat in war, to that of the preceding peace will be thus determined.

	Peace.	Y.	£.	s.	d.	War	Y.	£.	s.	d.
I.	1698	4	2	6	8	1702	11	1	19	11
II.	1713	27	1	15	10	1740	9	1	11	6
III.	1749	6	1	13	11	1755	8	1	17	2
IV.	1763	12	2	8	3	1775	8	2	1	11
Number of terms		4	8	4	8			7	10	6
Great Averages			2	1	2			1	17	7

The general average of a term of peace preceding 2*l.* 1*s.* 2*d.* exceeds that of the following war 1*l.* 17*s.* 7*d.* by 9*l.* 1*os.* 8*d.* per cent. The excess of the following peace over that less rate (note c) is 6*l.* 12*s.* 2*d.*; the mean of which is 8*l.* 2*s.* 5*d.* per centum; by which the price of bread-corn in any year of war would have been increased if peace had before taken place. And if that price in war had been six guineas, that of the preceding peace would have been

been 6*l.* 18*s.* 0*d.*: of the following peace 6*l.* 14*s.* 3*d.* And if the first peace had continued, it would have been 6*l.* 16*s.* 1*d.*

(E) Taking these petty wars into the divisions of the table, the average prices of the quarter of eight bushels of wheat in the several terms will stand thus; according to

	MR. HODSON.	DR. ADAM SMITH.
	£. s. d.	£. s. d.
War 1702	2 4 11	1 19 11
Peace 1713	2 6 1	2 1 0
War 1719	1 16 0	1 12 0
Peace 1721	1 18 11	1 14 8
War 1734	2 0 11	1 16 5

(F) On the mode of finding the price of corn for any required year, having the correct prices of two given between which it somewhere falls. Also if three such yearly prices be given, to determine that of any intermediate year, between the first and last.

The rates of the wheat market on certain years, are more correctly given by averages formed from those of an equal number of years before and after, than by the absolute price of the year; which is subject to an irregular and considerable rise or fall from accidents. But the principles on which the prices of other years are found lying between those of which the correcter rates are given, require some explanation; as perhaps no political arithmetician has applied them but Mr. Gregory King; and he concealed his process, giving only results: the most simple case of its application is to be begun with: of itself it seems plain enough to have been left without any



any explanation: it is therefore only given here, as opening the way to that of the second, which is somewhat more complicated.

Having two correct prices of a commodity given; one for an assigned year, and the other taking place at a certain number of years after it; if they be equal, the market is to be taken not to have varied in the whole term: if the second exceed the first, the rates are to be supposed to have been augmented equally in equal times, if no cause appear to indicate otherwise; or their annual augmentations to have been equal; whereby the rate of any intermediate year will be assigned with the greatest probability. For both the given prices being taken from averages of sufficient length, the increase of the latter indicates the operation of a permanent cause; which is to be taken to operate equally or produce equal effects in all equal times of the whole period, if there exist no adequate indication to the contrary: because when an assumption is to be made, it ought to be the most simple that can be found to agree with the nature of the subject; to which description this conforms. And the same thing which is true of augments in this case, is true also of decrements in the converse; or when the first given rate is greatest.

Thus if the price of wheat at the beginning of a term of twenty-seven years be 523.84*d.* per quarter (which is the most commodious way in such instances of denoting its value) and at the end of the term it fall to 440.41*d.*; the decrease at the end of the twenty-seventh year will be 83.43*d.* and its constant annual decrement be 3.09*d.* whence its price at the end of any year may be found; as for instance the tenth. For from the beginning of the first to the end of the tenth year, it shall have fallen

10 x 3.09*d.*

10 x 3.09*d.* or 30.9*d.*: and at the former period, the price having been 523.84*d.* it would then become 492.94*d.*

Here the annual augmentations or decrements are taken equal, nothing indicating the contrary. It is now to be shown how those indications are to be followed, when discovered. Suppose, beside the prices at the beginning and end of a term of time, given as before, at some intermediate instant thereof, there be a third price given; if this be equal to what would be found from the two extremes, by the former process, there is no indication that the annual augmentations are not equal; but the contrary: but if it be either greater or less, it indicates that they are unequal; and that they are successively increased or decreased, as the case may be. And the same reasons which proved, that the successive augmentations ought to be taken equal in the first case; shew also, that the successive differences of the augmentations ought to be taken equal in the second. When therefore two prices, and a single interval of time only are given, the price in any intermediately time is to be found, by supposing the successive augmentations equal; as in the first case: but when three prices and two intervals are given, the successive augmentations then vary, but their differences are now perpetually to be supposed equal, as those of the prices themselves had been made in the former case. For arguing as before, the most simple assumption is to be made, that will bring out a result agreeing in every instance with what is given, or the nature of the subject as far as known. The mode of assigning the price at any given point of time, in the two intervals, and of preserving the condition described, is delivered in the lemma referred to in the text. When the first calculation upon it is given, it shall be proved by an arithmetical illustration, that this condition is observed;

served; although it will not be repeated in the subsequent applications of it.

As the use of this mode of proceeding has been long intermitted by political arithmeticians, here shall be given some further account of it: which may be of use, not indeed even to moderate proficients in a particular science, but to many others. When a series of prices of successive years are given, the augments are their successive differences, and are called first differences; and when the latter are equal, or have no difference, the second differences of the prices are nothing; and when the differences of the augments are equal, these being what are called the second differences of the prices, they are equal also: but now, the third differences are nothing.

When the first differences are equal, any term of the series of prices is to be found by the simplest case of the method of differentials. When their second differences are equal; it falls under the second; the next approaching to the preceding in simplicity, and the facility of proceeding by it. The operation by which the price for any required year is thus found, is called an interpolation; and after speaking of the application of this method to the purposes for which it was originally invented, Stirling thus describes the further extension of its use. "After this manner, many things that are difficult to observe at a certain time, may be determined accurately enough from certain observations taken before and after that time\*." And thus if the average prices of corn, for divers successive term of years of sufficient length, are to be reputed to be very nearly, the

\* Diff. Method, p. 130.

natural

natural prices of the middle term of each; the price thus determined from them, for any year between those of the two remotest given averages, will be the natural price also, as far as they are such in their proper years.

But the application of this mode will be condemned as a useless and unnecessary refinement; as an intricate deduction of results, which might be obtained in a plainer manner. I shall therefore add something here in defence of it against such remarks. The subject itself is of high importance, and a good approach to the determination of the natural price of corn on any required year, is important on the subject. *Such plainer ways of obtaining this I am utterly ignorant of; and I disbelieve their existence.* Abstruseness, in that sense in which it is objectionable, is a relative term: and when any thing is necessary to be sought after, the simplest known mode is never abstruse, in that sense: although it should be far more difficult and intricate than that used here. Moreover, it is certain, that the great inventor thought it not deficient in simplicity, when he said of it, "Though at first it seems intractable, yet the thing is otherwise." And added, that as a problem, "It was one of the most elegant and neatest fort that he had a desire to solve\*." There are other modes in which the same thing may be legitimately effected, and many to whom they are familiarly known; but is from no one of this description, that this mode of computing will be censured as abstruse.

(G) It follows from the second Case of the fifth Lemma of the Principia, Book 3d; and the three prices and two

\* Letter to Mr. Oldenburgh, 1676.

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intervals

intervals given above from the table; that if  $p$  be put equal the price of corn, at any instant of time of the whole period; and  $y$  the number of years, integer or mixed, elapsed from its beginning; then shall  $p = 539 - 2.699y - 0.0103y^2$ .

Hence to find the price of corn at the beginning of the year 1713; or that of the peace; taking  $y = 5\frac{1}{2}$ , we obtain  $2.699y = 14.844$ ; and  $0.0103y^2 = .311$ ; and their sum  $15.155$ ; and  $539 - 15.155 = p = 523.84$  as above.

Again, the years elapsed from the middle of the first war to the end of the peace, were  $32\frac{1}{2}$ ; which being put equal to  $y$ , the equation becomes  $539 - 87.717 - 10.879 = p = 440.41$  as above.

As the same operation will be afterward repeated for other terms and prices given, the form from which this equation, and all such are found, is here added. Call the given average price of the first term, whether of peace or war,  $p_1$ ; of the second or following term  $p_2$ ; and of the third  $p_3$ . Call also half the sum of the years of the first and second terms  $t_1$ ; and half the sum of the years of the second and third terms  $t_2$ ; find  $b = \frac{p_2 - p_1}{t_1}$ ; and

$$c = \frac{p_3 - p_2}{t_2}; \text{ and } d = \frac{p_1 - p_3}{t_1 + t_2}.$$

Then it shall be, putting  $p$  the price in any year  $y$ , of the period  $t_1 + t_2$  years; comprehended between the middle of the first and the middle of the second term;  $p = p_1 + by + \frac{1}{2}y^2 - p_1 \times cy$ .

Stirling, in his Differential Method, has repeated Newton's rule for finding such equations, without demonstration, Prop. xxix.\* But this want is supplied in Emerson's Differentials, Prop. viii. p. 23.

\* Translation by Holliday. For

For those who cannot have recourse to the latter legitimate proof, an arithmetical illustration of it is here given. The numerical equation being  $p = 539 - 2.699y - 0.0103y^2$ ; let the price of corn at the middle of the first peace, or the instant of the commencement of the term  $(t_1 + t_2)$  thirty-seven years, be required to be found from it. Here first, the number of years elapsed after such commencement, equal  $y = 0$  and  $y^2 = 0$ ; therefore the price at that instant will be  $p = 539 - 0 - 0 = 539d.$  as given.

Secondly, From the commencement of the term to middle of the following peace, the years elapsed were the latter half of the war  $5\frac{1}{2}$  years, and the first half of the next peace  $13\frac{1}{2}$  years; in all years  $19 = y$ . Here  $2.699y = 51.281$ ; and  $0.0103y^2 = 0.0103 \times 361 = 3.718$ . Whence  $p = 539 - 51.281 - 3.718 = 539 - 54.999 = 484d.$ ; the given price in the middle of peace. And putting  $y = 37$ , we obtain in like manner  $p = 425d.$  the given price in the middle of the second war. By such tentative evidence, Stirling has shown the truth of the general theorem; that is, the truth of its result applied to a particular case.

It is seen by the three given prices, that the market rates are perpetually decreasing: and if their amounts for a series of successive years be sought, it will be found, that the successive decrements vary: but that in their variation they observe the condition required above, that the differences of every two successive decrements are equal. This is to be shown as follows; let  $y$ , or the years past, be successively taken  $= 0, 1, 2, 3, 4, 5, 6,$  &c. and the resulting values of  $p$  be written in a column: by subtracting each value from the preceding, we obtain the series of decrements of the prices of the

the successive years: and these being ranged in a second column, their differences will be found to be equal.

Y.	Prices.	Decrements.	Differences.
0	539.000		
1	536.291	2.709	
2	533.561	2.730	.021
3	530.811	2.750	.020
4	528.040	2.771	.021
5	525.248	2.792	.021
6	522.436	2.812	.020

And here if the number of the places of decimals in the column of prices had been increased, the digits in the third place of the second differences would have been equal.

The equation of prices is of the second power. And of all such equations it is universally true, that if we substitute successively for the root, the terms of the series 0, 1, 2, 3, 4, &c.; the differences of the successive augments or decrements of the series of values so found, or the second differences of the values themselves, will be equal: this follows from the known property of a series of squares of arithmetical progressionals.

Dismissing this elucidation of the truth and nature of the processes here pursued; we now are, following the authority of Dr. A. Smith, to suppose the given averages are prices of quarters of nine bushels of wheat: in that case it is evident, the prices of the middle point of time of the first war, the intervening peace, and the second war, 539, 484, and 425*d.* must each be reduced one ninth, or to 486, 431, and 378*d.* respectively, the successive rates of the legal quarter of eight bushels: A change, it will be said, in the data from which the cele-

rities

rities of the fall of prices were determined in war and peace, of such magnitude, as may entirely alter the result of the former process; and furnish a numerical proof, that the effect of peace is to accelerate that fall considerably.

It must therefore be now shown, that in each case the celerity of the fall is the same. This is done as follows: calling the three prices at first given, those of the quarter of nine bushels,  $p_1, p_2, p_3$ : those of the legal quarter of eight bushels were, at the same times,  $\frac{8}{9}p_1, \frac{8}{9}p_2, \frac{8}{9}p_3$  respectively. And putting  $n = \frac{8}{9}$ , the equation defining the price of nine bushels in all times, having been  $P = 480 - 2.392Y - .0098Y^2$ ; that defining the price of the legal quarter will be  $nP = n \times 480 - 2.392nY - .0098nY^2$ . The quantity  $Y =$  the time elapsed from the beginning of the term being the same in both cases; let now  $Y_1 = 5.5$  as before; take  $p_1$ , equal the price of the Windsor quarter at the commencement of the peace; as found by the first equation: then the value of the legal quarter will be  $n p_1$ ; and let the years elapsed to the end of the peace  $Y_2 = 32.5$ : at that term, calling the price of the great quarter  $P_2$ , that of the less shall be  $n P_2$ : and the annual fall in peace, will be in the former case  $\frac{P_1 - P_2}{27 = (32.5 - 5.5)}$ ; and in the latter  $\frac{n \times P_1 - n \times P_2}{27}$ .

The mean annual fall of the two wars is to be now sought: the difference of the prices in the middle of the first and second war, according to Mr. H.'s table, was  $p_1 - p_3$ : and according to Smith's,  $n \cdot p_1 - p_3$ . Whence the total fall of the two semi-terms of war were  $\overbrace{p_1 - p_3}^{P_1 - P_2}$  and  $n \cdot \overbrace{p_1 - p_3}^{P_1 - P_2} - n \cdot P_1 + P_2$ , respectively. And the length of those two semi-terms having

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having been in each case ten years, the annual war decrements were in the former  $\frac{p_1 - p_3 - p_1 - p_2}{10}$ ; and in the latter  $\frac{n \cdot p_1 - p_3 - n \cdot p_1 - p_2}{10}$ ; wherefore the peace and war decrements were in both cases in the same proportion to each other: for  $\frac{p_1 - p_2}{27} : \frac{n \cdot p_1 - p_2}{27} :: \frac{p_1 - p_3 - p_1 - p_2}{10} : \frac{n \cdot p_1 - p_3 - n \cdot p_1 - p_2}{10}$  or  $D : nD :: d : nd$ . Here  $D =$  equal the yearly decrement of peace by Hodson's table  $= 3.09$ ; and  $nD =$  the same by Smith's  $= 2.747$ . Again  $d =$  yearly war decrement of first table  $= 3.057$ ; and  $nd =$  that of the second  $= 2.718$ . And  $3.097 : 2.747 :: 3.057 : 2.718 :: 100\text{£} : 98\text{£} . 18\text{s} . 4\text{d}$ . Therefore in both cases alike, the annual decrement in war fell below that of peace, by  $1\text{£} . 1\text{s} . 8\text{d}$ . per cent.

(H) Here proceeding as before, the price at the beginning of the intire period having been  $458\text{d}$ .; the first interval of time seven years, the price at the end thereof  $502\text{d}$ .; the second interval ten years, and the final price  $593\text{d}$ .; putting  $Y$  for any number of years elapsed of the intire period, and  $P$  the required price of the year, we have  $P = 458 + 5.130Y + 0.165Y^2$ . Taking now  $Y = 3$ ,  $P = 474.87$ ; and again,  $Y = 11$ ;  $P = 534.39$ .

In Hodson's table, the prices for the whole of the term are stated to be of quarters of eight bushels: but according to Dr. A. S. these prices during the war of 1755, the whole of the preceding, and the three first years of the following peace, were the selling values of the Wind-for quarter of nine bushels: and those of the last nine years

years of the second peace, were the undoubted prices of eight bushels. And here the difference of the data materially affects the results.

Now, therefore, following Dr. A. S. it appears (from table Note B, Sect. IV. and Note F, Sect. VI.) that  $p_1 = 407$ ;  $p_2 = 446$ ; and  $p_3 = 579\text{d}$ . Also  $t_1 = 7$  years and  $t_2 = 10$  years as before, whence  $P = 407 + 2.389Y + .4546Y^2$ . Taking  $Y = 3$ ,  $P = 418.258\text{d}$ .; and again  $Y = 11$ ,  $P = 488.285\text{d}$ . Whence the rise of wheat in eight years of war was  $70.027\text{d}$ .; and its mean annual augment  $8.753\text{d}$ . Moreover in eight years of war and nine years of peace, the total advance was  $(579 - 407) = 172\text{d}$ .; whence that of nine years of peace was  $101.973$ ; and its average  $11.330\text{d}$ .; the latter exceeding the former  $29\text{£} . 8\text{s} . 6\text{d}$ . per cent. In the former period the measure of the difference of the proportional effect of the perturbing cause and of the power of depression of war, was negative; and equal to  $-1\text{£} . 1\text{s} . 8\text{d}$ .; but the sum in the latter is affirmative,  $29\text{£} . 8\text{s} . 6\text{d}$ .; and the double measure of the depressing power of war, is the sum of both; or  $(29\text{£} . 8\text{s} . 6\text{d} - 1\text{£} . 1\text{s} . 8\text{d}) = 28\text{£} . 6\text{s} . 10\text{d}$ .; the half whereof is  $14\text{£} . 3\text{s} . 5\text{d}$ . Thus the measure of the power of war to depress prices, appears, following Dr. S. to be greatly superior to that found above.

(I) Proceeding as in the two former cases, the following equation is obtained:  $P = 484 - 8.695Y + 0.301Y^2$  where the value of  $P$  will be the lowest possible, when  $2 \times 0.301Y = 8.695$ ; or  $Y = 14.4$ : in which case  $P$  becomes equal to  $484 - 125.20 + 62.41 = 421.21 = 1\text{£} . 15\text{s} . 1\text{d}$ . But according to Smith the given prices are all of the quarter of nine bushels; now for that of eight, the equation will be  $nP = n \times 484 - 8.695Y + 0.301Y^2$

and the value of  $nP$  will be least, when  $.0622nY = 8.695n$  and  $Y = 14.4$  as before. But the minimum  $nP = n \times 421.21 = 374.41d.$ ; or  $1\text{ } \text{£} . 11\text{ } s . 2\frac{1}{2}d.$  the legal quarter. (For the second equation, see Note F, Sect. VI. and for the determination of the instant of the least price, Example 2d, Prop. xxix. of Stirling's Differentials.)

(κ) The comparison in the text would stand thus according to Dr. A. Smith. The sum of the prices of the first fifty-two years, with the half of that of 1740, was  $103\text{ } \text{£} . 8\text{ } s . 6d.$  and the average of the term  $1\text{ } \text{£} . 19\text{ } s . 4d.$  and that of the last fifty-two years, with the half of the same year,  $107\text{ } \text{£} . 0\text{ } s . 5d.$  and the yearly average was  $2\text{ } \text{£} . 0\text{ } s . 9d.$  Thus the latter rate, exceeds the former, by  $1\text{ } s . 5d.$  the quarter; and by  $3\text{ } \text{£} . 12\text{ } s .$  per cent. This is the reverse of the conclusion obtained from Mr. H.'s table.

The amount and proportion of the annual opposite variations, are thus found from Smith's table. The price of the quarter of wheat at the end of 1692 was  $2\text{ } \text{£} . 5\text{ } s . 1d.$  in forty-seven years and a half it fell to  $1\text{ } \text{£} . 11\text{ } s . 2d.$  or  $13\text{ } s . 11d.$  nearly. And its annual decrement was  $3.507d.$  In 1787 it had risen from its lowest depression, to  $2\text{ } \text{£} . 6\text{ } s . 2d.$  and the advance was  $14\text{ } s . 11d.$  nearly: and its mean annual advance in the second term of forty-seven years and a half, was  $3.778d.$  exceeding the mean annual decrement of the first term,  $7\text{ } \text{£} . 14\text{ } s . 6d.$  per cent. this also is contrary to the result of the other table.

From the year 1740 to the present time, the operation of a permanent cause augmented the rates of the market: its measure is different according to Hodgson and to Smith; and greater by the latter. By both it appears to have

have operated in war as well as peace, but with most effect in peace: therefore the main question whether war tends to increase or depress the price of wheat, is not at all implicated in this difference of the two tables. It has been ascertained that the effect of war is of the same kind, either being followed, although they give different measures of that effect.

It will be without doubt disagreeable to those who shall examine this tract, to have to peruse a double set of operations for every process; but they will be sensible, that no calculator gives them such embarrassment of his own choice. As the elements were different, they might have given not only different but opposite results, on the main question. To remove all doubt therefore on that point, it was necessary to determine those of both.

(1) The sums entered in the columns of duties are the seignorage of the metal, or coinage duties only; and their title is too comprehensive. For in the first period of sixty-five years, when the metals paid the double tax or one fifth to the king, with the coinage duty of one and a half per cent., and in the latter of forty-nine years, when it was single, with the same addition; the only duties charged in the table are one and a half per cent. nearly upon the product: which is thus shown in the most important article, the silver. In the first sixty-five years, while the king's greater duty was one fifth nearly, the quantity of silver on which it was paid was 6,222,267 marks. The mark was at various rates, in different periods, but the most permanent was eight dollars, five rials, and thirty mervadies; taken also as its constant value in the text. That sum therefore amounted to 429,840,267 rials; and the tax the table states to have been received on

on this sum, was 6,360,638 rials. Here neglecting all places of figures after the fifth, the tax of which an account is given, appears to have been (1.4797) one and a half per cent. Likewise in the second term, after the great duty was reduced to a tenth of the silver nearly, the product in forty-nine years was 15,471,791 marks, or 1068,801,289 rials; and the duty charged 16,389,006 rials, being at the rate of (1.5334) one and a half per cent. The greater tax, reduced from one fifth to one tenth, is therefore not noticed in the table.

The mean of the two rates 1.4797 and 1.5334 is 1.5060 per cent. or one and a half per cent. very nearly: the reason that the result is not exactly at that rate in each period, is, that the value of a mark, estimated in dollars, rials, and mervadies, varied in particular terms. The allowance to be made for those variations is not worth searching after.

As the sums in the columns of duties bear a fixed proportion to the value of the products; nothing can be discovered from the former, but what is deducible also from the latter: no use therefore is made of them—it was necessary however to give an account why they are passed over.

(M) *On the effect of the lost fall of the duties of gold and silver, it being supposed, that the time expired is of sufficient length to determine its measure.*

In the year 1775, and the three following, duties were paid on 330,912 gold castellans: during the first two years and three quarters, at the old or higher, and the last five quarters, at the reduced rates: the product of the two terms is not distinguished, the sum of both only is given. But from the annual average of the preceding

twenty

twenty years, the first of these sums may be determined with considerable probability. The total of the whole term was 816,158, and the yearly average 40,807 castellans: in the term of two years and three quarters, duties were therefore paid on 112,217; and in the last five quarters after the reduction of the tax on 218,695; or on 174,956 castellans in one year: which exceeds the average of twenty years, 40,807, in the proportion of 428.72 to 100. If the average of thirty years be taken, the result is very nearly the same. But if ten years further back had been admitted into it, the process would have become vitiated. For that term of ten years commenced in 1735; and the table here followed indicates, that in the first five years of the term a new gold mine or mines were discovered, of such fertility, as that suddenly the taxed total product, was much more than trebled; and in the second equal time more than doubled; but in the following five years, this new source appears to have been nearly exhausted.

The effect of this anomalous increase is such, that divided in the average of forty-nine years, it raised it nearly in the proportion of six to four. That average is given in the text, 61,344 castellans a year: if it shall be contended that it ought to be made the basis of computation, the product of a year after the last reduction, will appear to be 129,772 castellans, or the double thereof only: but this supposes two augments of the average of the last twenty years to have taken place, in the five quarters the reduction of the tax had subsisted: the first the effect of that measure, doubling the quantity of the gold paying duty; and the second, accidental discoveries or increase of the product of the old mines, which at the same

time

time increased that amount about fifty *per cent.* a circumstance not to be gratuitously admitted.

It is certain however that the basis on which the specific proportion assigned stands, is so narrow, that if ever an average result of the measure on an adequate term of time can be obtained, it must probably be found to vary considerably from it. Whether the variation will show an excess or deficiency in the former, cannot be on any firm ground conjectured; but the evidence from what is known, is sufficient proof that the quantity of gold from these mines, imported into Europe, must be greatly increased by this reduction of duties; although the definite proportion of the increase cannot be fixed.

A like but inferior increase is in the same manner found to have taken place, in the product of silver at that time. Its average for the twenty years preceding 1775, had been 297,817 marks; which by the reduction of the tax, appears to have been augmented to 1,043,032 marks; or in the ratio of 350.22 to 100.

(N) *On the richness of the newly discovered mines in the province of Sonora and Cinaloa.*

The proportion of the English to the Spanish ounce may very well be taken as six to five\*: and the mint price of gold of the standard fineness being here 3*l.* 17*s.* 10*d.*  $\frac{1}{2}$  per ounce, the value of the Spanish ounce is 3*l.* 4*s.* 10*d.*  $\frac{3}{4}$ . The assay of one of those masses of gold called grains is given; it was found to be precisely of our standard fineness; the same is presumed of the rest. The value of the mark of gold in these grains is 25*l.* 19*s.* 2*d.* and that of those at nine marks 233*l.* 12*s.* 6*d.* each.

\* 117 marks Spanish equal to eighty-nine eight ninths of London. Harris Lex. Art. Weights, v. 1. from Malines?

Robertson

Robertson in his note on the passage inserted in the text says, that in the account of this expedition, there is mention made of a grain found in the mine of Yecorato, in Cinaloa; which weighed sixteen marks, four ounces, and four ochavas; which is now deposited in the royal cabinet at Madrid. Its value is 429*l.* 18*s.* 8*d.* The grains collected in the plain of Cineguilla weighed 1000 marks; and were in value 25,958*l.* 6*s.* 8*d.* and it was estimated, that from the soil turned up, there might have been extracted a million of pezos: which at 4*s.* 6*d.* each, were in value 225,000*l.* the amount of the grains and dust jointly was 250,958*l.* on the first reduction of the tax on gold at the mint of Goanaxuato, the quantity was increased seven fold on an average of forty-nine years, or in amount to 36,815*l.* sterling: whence the above sum 250,958*l.* was nearly equal the gold entered there, in six years and nine months.

(O) A near approach may be made to the determination of the rate of advance *per cent.* by which the change of the proportion of the consumption of wheat in bread to that of rye and barley, has increased: the charge of the maintenance of labourers in that article, in the following manner:

Let the total product of wheat and rye in 1688, be first taken to have been consumed as food for man: and as the barley so used was at the same time considerable, let it be admitted to have been one fourth the quantity of the latter. The consumption of wheat, rye and barley was of 14,10\*, and 2  $\frac{1}{2}$  millions of bushels respectively; and the total twenty-six millions and a half.

† Robertson, Amer. v. 3. N. 73. \* King. See Davenant, v. 2. p. 217.

But



But the use of the inferior kinds of grain was not, at that period, intirely confined to the class of people labouring for hire: a considerable quantity was also consumed, by the lower orders of those whom Mr. King enumerates in the first division of his table of classes\*, whose intire income to support their families, did not amount to 50*l.* yearly; although they used wheaten bread in a much greater proportion than the labourers. Let it be therefore admitted that two thirds of their consumption was intirely of wheat; and the remaining third, of bread of the several species of corn, mixed in the same proportion as that eaten by the lower class: or, which amounts to the same thing, that two thirds of those who fell under this description, consumed no other grain but wheat; and the remaining third the same bread as the labourers. These individuals form three orders in Mr. King's table: a third of the number comprehended in the whole of which is 405,000. Therefore in a population of five millions and a half, the number subsisting upon wheat entirely was 2,270,520 persons.

Now wheat is more nutritious than either of the inferior grains; but this richer class are less parsimonious in their consumption than the lower; and the one circumstance shall be taken to balance the other. Wherefore the quantity of bread corn used by them was as the numbers of each. Now our whole population at the time Mr. King wrote, having been five millions and a half; and our consumption having been twenty-six millions and a half of bushels of bread corn; that of 2,270,520 persons, was 10,939,000 bushels very nearly: and this being intirely of wheat, there remained for

\* King. See Davenant, v. 2. p. 184, table.

the

the 3,229,480 persons who eat the inferior bread; of wheat 3,061,000 bushels; of rye 10,000,000; and of barley 2,500,000; the total of which is 15,561,000 bushels.

The bushel of wheat "was worth three shillings and sixpence upon the spot where it grew," at that time: "but this value was increased by carriage to the place where it was last spent at least one-fourth more\*." The former, although the mode of expression is singular, was the value of the corn standing on the ground. The addition is the aggregate of the insurance against the hazard of weather in getting it into the barn, the charges of harvest, of threshing and carriage to market. The average market price of wheat was therefore 4*s.* 4½*d.* the bushel. In like manner the price of rye in the field was 2*s.* 6*d.* in the market 3*s.* 1½*d.*; and the corresponding values of barley were 2*s.* and 2*s.* 6*d.* And the total value of the corn consumed by 3,229,480 persons, was 2,544,593*l.* It was necessary to go into these particulars; for Dr. A. Smith has supposed the former rates to have been what he calls contract prices; or the rates at which the farmer will sell his wheat to the merchant at home. He supposes him therefore to abate 20*l.* per cent, "to avoid the trouble and expence of marketing†:" his defence of this is by a second error: he shows this rate to be higher than that of the particular year 1687; but the table he gives, proves that year to have fallen below the average of the ten years which it finishes, in the great proportion of five to eight and a half‡: and still more below that of the eight years preceding those ten.

\* King in Davenant, v. ii, p. 217.

† V. i. p. 307.

‡ P. 404.

But

But in the year 1772, barley had grown into total disuse as food for man. The author of the political essays quoted above speaks of it as that of animals only\*. The proportion of wheat then raised, to that of rye, was considerably increased; and had become as 384 to 103. A proportion which also would have obtained in 1688, if the superior kind of corn, wheat, had been as commonly consumed then, as at that subsequent period; as the production of both would have been as the demand for each. Therefore, of the  $26\frac{1}{2}$  millions of bushels required to feed the whole people, 5,604,700 only would have been of rye; and the remainder wheat; the demand for barley as human food ceasing intirely. And the consumption of the eaters of inferior bread 15,561,000 bushels would have exhausted the whole of the rye 5,604,700, together with 9,956,300 bushels of wheat: the value of which, at the rates given above, is 3,053,673*l.* Whence by decreasing the proportion of the inferior grains in their food, the charge of supplying this number of persons with bread-corn, was increased in the proportion of 3,053,673*l.* to 2,544,593*l.*; or (20.007) 20*l.* per cent.

This augment had taken place in eighty-four years; and there has since elapsed twenty-eight, in which some further increase of its amount has taken place. It undoubtedly advanced with the greatest celerity in the first period: and if that first celerity may be supposed to be in measure the double of the latter, the advance in the last twenty-eight years, will be equal to that of fourteen of the former term; or one-sixth of its whole amount. Therefore estimated in this mode, the effect of the

\* P. 100.

change

change of food, has raised the charge of the bread-corn consumed by this body of men, 23*l.* 6*s.* 8*d.* per cent.

If any proportional part of the product of wheat and rye, as a twentieth or twenty-fifth of each, were employed for any other use than food for man at both periods; the same rate of advance of the charge per head would have been found. Any variation from this would have made a proportional variation in the result, but it was probably so little that its effect may very well be neglected: yet some greater proportion of wheat, than of rye, must be supposed to have been applied to such other uses. Therefore first let the quantity of the inferior grains used in food, be supposed to continue fixed; and the wheat alone so consumed to have been diminished: the total consumption of the three species will have been diminished by the same quantity; together with the share of the lower class, in proportion of its numbers to the whole population. This share being therefore less, and its consumption of the two inferior grains the same, its proportional part of their whole expenditure was less: therefore the rate per cent. of the increase of the charge, from the change from the former to the present proportion, was greater.

And if the two products be diminished in two different proportions, the wheat will have been diminished in the greater: the consequence whereof will be the same as if the inferior corn eaten, had remained undiminished; but the wheat had been decreased by the difference of the two ratios alone; the increase of the charge in this second case would have been greater also.

If the number of persons so fed be reduced or increased one half, or in any other proportion, the absolute charge of the first or second mode of providing bread-corn for them,

them, would be reduced or increased in the same proportion: but still that of the second would exceed the first, by the same rate *per cent*: which rate is also the measure of the increase of charge for an individual, or any equal number of individuals, as far as it arises from the difference of the proportions of the species of corn consumed only.

The prices of wheat, rye, and barley, as taken from Mr. King, are respectively as 7, 5, and 4: and in whatever manner the prices shall vary, still preserving the same proportions to each other, so that each shall become one half or one third of those given by him, or in any other ratio more or less; the advance of the charge *per cent*. will be found the same. The three last conclusions follow from the nature of proportionals.

But the ratio of the prices of the three grains, assigned by him in 1688, seems to hold to this day. This appears from the two following extracts from Mr. Catherwood's register, which are the only ones I can now give.

Average prices of the Winchester bushel in England.

Of	Wheat		Rye		Barley	
	s.	d.	s.	d.	s.	d.
1779	4	2½	2	11	2	5½
1791	5	10½	3	11	3	2¼
<i>Mean of two years</i>	5	0½	3	5	2	10
<i>Price by King's Proportion</i>	5	0½	3	7	2	10½

These proportions therefore seem extremely well determined at that time by Mr. King, and to remain fixed.

And

And upon the same account, the change of the quality of food from corn, the rates for the support of the poor would have been found to have increased nearly in the proportion above determined: but other causes have been combined with it; so that the increase has been in a ratio compounded of the proper measures of all of them.

(P) From the accounts of Mr. Glover, pro-inspector general of exports and imports, presented to the house of Lords July 10th last, of foreign wheat imported into the port of London, in the last nineteen years and a half; an evident proof is derived of the reality of a great failure of crops in the last seven years and a half.

In the first twelve years contained in this account, beginning with 1781, there were imported into the port of London 510,123 quarters of foreign wheat; and on the average 42,510 annually: during the last seven years and a half, the total import was 1,676,289; or 223,505 quarters yearly. But the import of the year 1794, in the copy of the account here followed, being only 19,654 quarters, is certainly erroneously given\*. As therefore we are searching for the measure of the deficiencies of certain years of scarcity, it is to be left out of the average, determining its mean degree; whence the import of 6½ years of the present war correctly known, appears to have amounted to 254,866 quarters; which is to the import in ordinary years, as 599½ to 100; or 6 to unity.

But the mean deficiency of the crop during the present war, has exceeded that of the preceding peace, in a ratio considerably exceeding that of six to one. Because the high prices con-

\* St. James's Evening Post, July 12, 1800. The import of London is nearly two-thirds of that of the kingdom: the latter in this year was 324,637: there is therefore a figure omitted in the printing.

siderably

siderably diminished the total consumption; and the deficiency was equal the sum of the import, and the decrement of consumption jointly.

It does not however appear, that there was a progressive increase of the imports during this period of nineteen years and a half. Those of the first and last terms four years of the first twelve, were the greatest: and of these two, the former much exceeded the latter; and at least they must be taken as stationary. In the year 1793, the import rose *per saltum*; pointing out a failure of production from natural causes. That of the year 1796, it should seem, will exceed what that of the present year will ultimately be found to amount to; and perhaps in the proportion of 477 to 442, very nearly.

In 1795 there were imported into the kingdom, 287,930 quarters of foreign wheat; and into the port of London 198,911; and the excess of the former above the latter, was in the proportion of 144  $\frac{3}{4}$  to 100. In the following year, 1796, which was a year of great scarcity, the total import of the kingdom was 814,265, and of London 477,877 quarters; and the proportion of the first to the second import is that of 170  $\frac{1}{3}$  to 100: ratios not so differing from each other, as that either should be supposed very remote from that which generally obtains: the total import may therefore be taken, with considerable probability, to that of London, as 157 (or more nearly 157.57) to 100. The annual average import of the port of London having been 254,866 quarters, as above; that of England appears to have been 401,570.

This proportion seems for general purposes accurate enough; although its intire coincidence with the fact is accidental.

accidental. After the above computation was finished, I found that Lord Liverpool \* had averaged the importation of wheat, for the last five years, at 400,000 quarters.

It is said in note F, that Mr. King had applied the method of differentials, of which some use has been made above, to political arithmetic. Of these applications the most curious is, the determination of the price of corn from the rate of deficiency of the harvest given: his equation for this purpose shall be here added, with an example of the use of it, in the solution of the following question.

*The average price of wheat in the last peace being given, and the current estimate of the defalcation of the crop of last year in this part of the country, being admitted to be true for the whole kingdom; that it effectively fell short one third of its ordinary quantity; required the average price of corn of the year, being a year of war?*

By the first table, the price of wheat per quarter in the last peace was 554d.; the product of the year being of the average quantity: which by Section V, p. 23, exceeded the price of a like year of the following war, by 9*l.* 19*s.* 2*d.* per cent. If therefore the product of the last year had been of the mean quantity, the price of wheat would have been 505  $\frac{1}{2}$ d. the quarter. Which sum, according to Mr. King, is to be taken as 10; and the required price as P. And again that product also being taken as 10, the deficiency having been one third thereof, take D = 3.333: and it shall be universally P = 10 +

\* See account of his speech on the Flour Company Bill, July 21. St. James's Chronicle.

$2\frac{1}{3}D + \frac{1}{2}D^2 + \frac{1}{6}D^3$ . Which is the equation from which he calculated the table of advance of prices corresponding to "Defects" given by Davenant\*. Here putting  $D = 3\frac{1}{3}$  as above, we have  $P = 29.504$ . Therefore the price of wheat in ordinary seasons being as 10, in years of such deficiency will be as 29.504: moreover as 10 to 42s.  $1\frac{1}{2}d.$ ; so is 29.504, to 124s.  $7d.$ ; the average price of wheat per quarter, corresponding to the crop of the last year.

I had on a former occasion noted, that Mr. King undoubtedly obtained this equation, from the prices of malt for four different years or sets of years, when different prices took place; the amount of the Malt tax giving him the quantity made in each term.

\* Whit. Davenant, v. 2, p. 225.

FINIS.