

*Did Victorian Britain Fail?*¹

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Few beliefs are so well established in the credo of British economic history as the belief that the late Victorians failed. Statistical economists and literary historians, Englishmen and foreigners, late Victorians and moderns have accepted some version of it. The three senses in which Britain is said to have failed are that output grew too slowly because of sluggish demand, that too much was invested abroad because of imperfect capital markets, and that productivity stagnated because of inept entrepreneurship. The three are closely related. Slower growing demand, partly an inevitable consequence of new competition in world markets and partly an avoidable consequence of the shortcomings of British merchants and manufacturers, is said to have slowed British growth and, consequently, to have dulled the incentive to invest at home. The obstacles to investment were multiplied by imperfect capital markets, which channelled funds abroad to an even greater extent than warranted by the sluggish markets at home. In this milieu entrepreneurs had few opportunities to invest in new technologies. Again, however, the obstacles were multiplied by the inadequate response of the economy, for entrepreneurs were slow to take up even the limited opportunities open to them. Productivity, therefore, is said to have stagnated, worsening Britain's position in foreign markets, driving still more investment abroad, and closing the circle of failure. Few historians subscribe to the whole of this dismal tale, but many believe parts of it. The argument of this essay is that these beliefs are ill founded.

I

Since the early 'thirties when W. Hoffmann found that British industrial growth slowed noticeably after 1870, historians have suspected a failure in output growth. In a companion study to Hoffmann's, W. Schlote found that export growth also slowed after 1870. The correlation between industrial and export growth was suggestive and its discovery timely, for the new economics of the 'thirties seemed to provide it with a theoretical rationale. Aggregate demand, after all, determines output, and exports were a large part of Britain's aggregate demand. To many economists and historians it has seemed that this insight, though used by its discoverers to explain relatively brief periods of mass unemployment in the 'twenties and 'thirties, could also be used to explain the slow growth of the British economy in the forty years after 1870.²

¹ I should like to thank Professors P. David, S. L. Engerman, R. W. Fogel, P. Lindert, P. F. McGouldrick, J. R. Meyer, C. Pope, and R. Sylla for their comments on a version of this essay presented in January 1969 to the Purdue Conference on the Application of Economic Theory and Quantitative Techniques to Problems of Economic History.

² E.g. W. A. Lewis in *Economic Survey, 1919-1939* (1949), p. 74: "There can be little doubt that the main cause of the relative British stagnation was to be found in the export trade. In the first part of the nineteenth century the growth of British exports was astonishing. . ."; D. J. Coppock, 'The Climacteric of the 1890's: A Critical Note', *Manchester School*, xxiv (1956), 2: "The low rate of capital accumulation is explained partly by an exogenous decline in the rate of export growth, which reduced the incentive to invest."

cent per year from 1872 to 1907 while real exports grew at 2.36 per cent and real national income at 2.40 per cent.¹ The difference of 0.7 per cent per year between the growth of final demand and gross output is inconsistent with the assumption in input-output analysis of fixed intermediate requirements. It took less and less intermediate output to produce the final output of the economy. Neglecting this development (which may with some justice be called "productivity change") will lead to an incorrect estimate of the hypothetical rate of growth of industrial output.

Neither of these criticisms, however, alters the broad conclusion. The hypothetical rate of growth of gross output as a whole (and industrial gross output as a part of it) can be recalculated using the more economical argument that its growth must equal the hypothetical growth of final demand minus the growth of the ratio of final demand to gross output. The rate of growth of exports from 1854 to 1872 is taken to be the hypothetical rate of growth of final demand from 1872 to 1907 in the relevant sense. It matters little whether exports alone or all of final demand (consumption, investment, exports, and government spending) are treated as the exogenous variable, for they grow at similar rates. The change in the ratio of final demand (Imlah's index) to gross output (Hoffmann's index) is calculated from the observed change in the period 1872-1907. Subtracting it from the hypothetical growth of final demand yields a gross output growth rate of $4.37 - 0.67 = 3.71$ per cent per year from 1872 to 1907 had exports grown as they did from 1854 to 1872. This is indeed far above the growth-rate of 1.69 per cent per year in industrial output actually achieved from 1872 to 1907 and is higher even than the rate of 2.98 per cent per year achieved from 1854 to 1872. The emphasis on exports appears to be justified.²

The argument that Britain's output grew more slowly because of slower growing exports, however, assumes that aggregate demand alone determined output, when in fact there were constraints of supply.³ Indeed, there is evidence that they were the only binding constraints. If faltering export demand after 1872 held back the growth of the British economy there would have been increasing unemployment as actual output, cut by the insufficiency of aggregate demand, fell more and more behind potential output. But unemployment after 1872 was low and did not increase with time: the trade-union figures suggest that unemployment late in the period 1872-1907 was lower than it was early in the period. The Victorian economy was at full employment and the growth of real output was determined by the growth of the factors of production, such as fixed capital and skilled labour, not by aggregate demand. This, then, is the decisive criticism of the demand theory: in the situation of the Victorian economy it is more plausible

¹ The Hoffmann index used here includes building (the results excluding building are virtually the same). Exports are Imlah's index, given in B. R. Mitchell, *Abstract of British Historical Statistics* (Cambridge, 1962), p. 328. National income is C. H. Feinstein's estimate (his net national income deflated by Bowley's retail price index), *ibid.* p. 367.

² An improvement in the terms of trade arising from faster-growing export demand is not a part of the demand hypothesis as it is usually stated. The argument that follows, therefore, abstracts from it.

³ Since writing this I have discovered that D. H. Whitehead made essentially the same point about Meyer's argument in an interesting paper, 'The New Economic History: Counterfactuals and *Ceteris Paribus*', presented at the February 1968 Christchurch meeting of the Australian and New Zealand Association for the Advancement of Science.

to assume that supply created its own demand than that demand would have created its own supply.

The argument is that the hypothetical growth-rate of 3·71 per cent per year was impossible. Clearly, if all factors of production were inelastic in supply and if productivity change were exogenous, the achieved rate of growth would have been the limit of possibility. The question, then, is whether productivity change and the supplies of factors of production were responsive enough to the demands of the economy to permit a 3·71 per cent rate of growth.

The supply of labour was in all likelihood insufficiently responsive to the pressures of export demand in the late nineteenth century to permit so high a growth-rate. Unemployment was low and the rural pool of underemployed labour was by this time small.¹ Had all emigration from the United Kingdom ceased and had all these emigrants been of working age, the labour force might have grown at 1·6 per cent per year rather than at 1 per cent as it did from 1871 to 1911, but this is still low relative to the hypothetical growth of gross output.² If capital and labour were not substitutable, then, the slow growth of the labour force in the United Kingdom would have limited output growth. To put it the other way, had output grown at 3·71 per cent per year from 1872 to 1907 instead of 1·69 per cent the labour force at the end of the period would have had to have been twice as large as the actual labour force and two-fifths larger than the entire population aged 15 and over.³

If capital and labour *were* substitutable, an increase in capital per man could substitute in some degree for these improbable increases in the labour force. The magnitude of the necessary capital accumulation, assuming that the elasticity of substitution between capital and labour was unity, can be estimated from an equation of the sources of growth:

$$\bar{Q}_{go} = s_k \bar{K} + s_l \bar{L} + \bar{T}'$$

in which \bar{Q}_{go} is the proportional growth-rate of gross output in the economy, \bar{K} and \bar{L} the growth-rates of capital and labour, s_k and s_l their shares in national income, and \bar{T}' the rate of productivity change defined to correspond with gross

¹ The only detailed employment statistics are for Great Britain, not the United Kingdom. Agricultural employment was only 8·5 per cent of the British work force in 1911 according to Mitchell, *op. cit.* p. 60. It is appropriate to take a year late in the period 1870–1914 because the proposition to be refuted asserts that there could have been substantially more re-employment of rural workers than was actually accomplished. Domestic service might have been another source of labour, although most of the workers were women with little alternative employment available (as their low wages suggest). In any case, in Great Britain the sum of employment in agriculture, domestic service, and personal service was 22·6 per cent of the labour force in 1911, contrasted with 41·5 per cent in the United States in 1910.—U.S. Bureau of the Census, *Historical Statistics of the United States, Colonial Times to 1957* (Washington, D.C., 1960), p. 74.

² The estimates of total employment in the United Kingdom are those of E. H. Phelps Brown and S. J. Handfield-Jones in 'The Climacteric of the 1890's: A Study in the Expanding Economy', *Oxford Economic Papers*, n.s. iv (1952), 298. The emigration estimates are those of Ferenczi and Willcox, given in Mitchell, *op. cit.* p. 50.

³ Gross output in 1907 would have been twice what it actually was if it had grown at 3·71 per cent from 1872. If technology and the amount of capital per man were independent of the growth of the labour force, the actual ratio of gross output to employment in 1911 will serve as the ratio under the hypothetical conditions. Applying this ratio to the actual labour force raises it to 39·5 million.

output.¹ The growth equation can be solved for the rate of growth of capital,

$$\bar{K} = \frac{1}{s_h} [\bar{Q}_{go} - s_l \bar{L} - \bar{T}']$$

and placing the appropriate values in the right-hand side of the new equation yields the necessary rate:²

$$\bar{K} = \frac{1}{0.442} [0.0371 - 0.52 (0.0102) - 0.0050] = 0.0609$$

This 6.09 per cent per year rate of capital growth is in the vicinity of four times the actual rate in the late nineteenth century.³ The hypothetically higher capital growth would have had to have come from a great increase in the ratio of savings to income. Indeed, the disproportionate growth in capital would make the task more difficult because the capital-output ratio would rise, raising the savings ratio necessary for a given rate. Englishmen would have had to have saved about 42 per cent of their income—that is to say, an incredibly high proportion of it—for gross output to grow at its hypothetical rate of 3.71 per cent per year.⁴

The argument, of course, can be made the other way around: from a reasonable upper bound on the savings ratio one can deduce upper bounds on the growth of capital and output. An assumption about the outcome of such an exercise underlies much of the discussion of British opportunities at the end of the nineteenth century. As a matter of arithmetic higher savings are always possible, but the relevant historical question is whether the late Victorians were profligate in consumption compared with foreigners at the time or with Englishmen before.

¹ The constancy of the shares of labour, land, and capital over the period 1870–1914 suggests that a unitary elasticity of substitution is a reasonable approximation. A production function for gross output can be written

$$Q_{go} = F(K, L, Q_{go}^i, T')$$

in which Q_{go}^i is the quantity of intermediate material input corresponding to the particular degree of inter-industry detail chosen and T' is a parameter of technological change or time. The equation in the text can be derived from this production function. The shares attached to \bar{K} and \bar{L} are the shares in national income, not the shares in gross output. T' is about 0.005, using the data of the next two footnotes and the growth-rate of the Hoffmann index (1.69 per cent per year).

² The growth-rate of gross output is the hypothetical rate derived earlier. If the elasticity of substitution is one the shares of capital and labour will not change with different endowments. Consequently, the observed shares will be the shares under the hypothetical increase in the capital-labour ratio. The value 0.52 for labour is derived from the share of P. Deane and W. A. Cole's wages and salaries estimate in home-produced income (*British Economic Growth, 1688–1959*, Cambridge, 1964, p. 247) and the value 0.44 for capital is derived from the residual from 1.00 of land's share (based on Stamp's estimate of net property income) and labour's share. The rates of growth of labour (0.0102 each year) and productivity are also assumed to be the same under the new regime of rapid capital accumulation. The assumption that faster capital accumulation had little long-run effect on the rate of productivity change is justified by the pattern of productivity change reported below.

³ The estimate of the growth of domestic fixed capital is 1.43 per cent per year, 1870–1910. Its derivation is explained below.

⁴ The capital output ratio, v , must have averaged about 4.9 in 1870–1910 because domestic fixed capital formation was about 7 per cent of income (a low estimate) and the capital stock grew at about 1.43 per cent ($7/1.43 = 4.9$). This agrees roughly with Deane and Cole's estimates (op. cit. p. 274). In 1870, therefore, a 6.09 per cent growth of capital would require a savings ratio of (4.9) (6.09 per cent) = 30 per cent. After 1870, with the capital stock growing at 6.09 per cent and national income at 4.34 per cent (the hypothetical growth rate of exports), v would rise from 4.9 at $6.09 - 4.34 = 1.75$ per cent each year. By 1910 it would be 9.95 (!) and the required savings ratio would be (9.95) (6.09) = 60.5 per cent. The geometric average of 30 and 60 is 42.

The evidence suggests that they were not. American savings ratios were higher than British ratios, but the difference was small. For example, from 1886 to 1900, by all accounts a period of low British savings, the British ratio of net investment to net national income averaged 10·4 per cent, while the American ratio averaged 13·7 per cent, a difference of 3·3 per cent of income.¹ Nor were savings a much higher share of national income before 1870: the savings ratio averaged 12·8 per cent from 1858 to 1873. Given the probable range of error in the estimates, the differences are insignificant. More important, if the order of magnitude of the deficiency in the savings ratio were 3 or 4 per cent of income, making up the deficiency would have had a small impact on the rate of growth of income. British emulation of the American standard of thrift, for example, would have raised the rate of growth of domestic capital by about a half of its former rate and the rate of growth of income by less than a tenth.² In other words, the route to significantly higher income growth by way of a rise in the savings ratio was not open to late Victorian England.

II

It is likely, then, that there were binding resource limitations on the growth of the British economy in the late nineteenth century. By reallocating resources, of course, any one sector of the economy could have grown faster: industry could have grown at the expense of services and exports at the expense of production for home consumption had labour and capital been allocated differently. The most popular target for hypothetical reallocation has been Britain's enormous holdings of capital abroad in the late nineteenth century. The common view is that if investors had been restrained from sending abroad a third of the savings available for capital formation, Britain would have been better off. It is clear that in this case Britain's domestic capital stock would have grown half as fast again. It is not clear, however, that exchanging domestic for foreign capital would have raised British national income. The question is how bringing capital home could be expected to increase income and how large the increase would have been.

If world capital markets were functioning efficiently, of course, a prohibition of investment abroad would have reduced British national income. Most of the supporters of the hypothesis of immiseration by capital exports have accepted the assumption that the enlightened self-interest of investors in perfect capital markets maximizes national income.³ Their case has rested, therefore, on two themes:

¹ These years were chosen to include the years of very low saving in the 'nineties and to cover one and a half business cycles (in order to ensure that the average approximates the underlying trend). Net investment in the United Kingdom is estimated as the sum of Feinstein's net fixed investment series (Mitchell, *op. cit.* p. 373), Imlah's overall balance on current account (*ibid.* p. 334), and 40 per cent of the annual change in Feinstein's net national income (*ibid.* p. 367; this is the traditional way of estimating inventory investment). The ratio for the United States is S. Kuznets' estimate of net capital formation divided by his estimate of net national product for three quinquennia from 1887 to 1901 (U.S. Department of Commerce, *op. cit.* p. 143). It is more comprehensive than the estimate for the United Kingdom.

² Income growth rises less than in proportion to the rise in capital growth because there are other sources of growth, i.e. labour growth and technological change.

³ Strictly speaking, the assumption is false. National income would have been maximized if Britain had acted as a monopolist in the export of capital, as M. Kemp points out in the chapter 'Foreign Lending and the National Advantage—The Lending Country' in his book *The Pure Theory of Inter-*

first, that investors were not enlightened; and, second, that capital markets were not perfect.

The main sort of unenlightened behaviour is said to have been investment in foreign projects with a high risk of default. Even J. M. Keynes, however, who led the attack in the 'twenties on investment abroad, did not base his argument on a supposition that Englishmen invested in risky projects abroad, any more than in risky projects at home, without demanding interest compensation for the risk. His primary point was, rather, that in default the physical capital abroad was lost to Englishmen: "If the Grand Trunk Railway of Canada fails its shareholders . . . we have nothing. If the Underground System of London fails its shareholders, Londoners still have their Underground System."¹ The significance of the point depends on the magnitude of the defaults and in the period 1870-1913, as A. K. Cairncross has observed,² they were small. Even in the 1870's, which was "probably the least remunerative decade in the sixty years before the war", defaults on investments abroad were "a comparatively small amount".³ Defaults were not an important drain on British capital before the war.

The more common theme than the loss from default in the literature of immiseration by capital exports is the perversity of Britain's imperfect capital market. The City, the story goes, was expert at channelling British savings into foreign trade credit and railway bonds, but inexperienced at serving the industrial hinterlands of Britain itself.⁴ Keynes, for example, emphasized the Colonial Stock Act of 1900 and similar Acts before it which permitted British trust funds to be invested in colonial railway and governmental bonds, giving, he claimed, an artificial incentive to investment abroad. The effect was "to starve home developments by diverting savings abroad and, consequently, to burden home borrowers with a higher rate of interest than they would need to pay otherwise".⁵

The logic of this and similar arguments based on an artificial preference by some lenders for lending abroad is not compelling. If borrowers in the colonies

national Trade (Englewood Cliffs, N.J., 1964). The monopoly gain from restricting the export of capital, however, would have been trivial. A rough calculation using the assumptions described below suggests a gain of the order of one-tenth of 1 per cent of national income.

¹ J. M. Keynes, 'Foreign Investment and National Advantage', *Nation and Athenaeum*, xxxv (1924), 584-7.

² A. K. Cairncross, *Home and Foreign Investment, 1870-1913* (Cambridge, 1953), pp. 225-30.

³ *Ibid.* p. 228. On p. 225 he remarks that "there were constant defaults . . . but, for the most part, with the exception of those of the twenties and seventies, of a comparatively minor character." A complete case would require more definite information on defaults.

⁴ C. P. Kindleberger put it: "Capital flows in channels, and these had been dug between London and the far reaches of the empire, but not between London and the industrial north."—*Economic Growth in France and Britain, 1851-1950* (Cambridge, Mass., 1964), p. 69. Cf. D. Landes, 'Technological Change and Industrial Development in Western Europe, 1750-1914', in M. Postan and H. J. Habakkuk, eds. *The Cambridge Economic History of Europe*, vi (Cambridge, 1965), 576. The belief in capital market imperfections is inconsistent with the conclusions of both Kindleberger and Landes that there was no shortage of capital to domestic industry. The imperfections, if effective, would have restricted the supply.

⁵ Keynes, *op. cit.* p. 586. All of his arguments have more force in the 'twenties, when he formulated them, than in the decades before the war. On the other hand, he exaggerates the incentive given by the Trustee Acts to lending abroad. The Acts applied only to the minority of trust deeds that did not specify the form the lending was to take. Moreover, they permitted investment at home not only in consols but also in mortgages, railway bonds, and issues of local authorities. Cf. Cairncross, *op. cit.* pp. 89, 95, and C. K. Hobson, *The Export of Capital* (1914), p. 48.

were, in fact, offering lower interest rates than borrowers with similar credit standing at home, there would be an incentive for British lenders who, unlike the trustees, had no special motive for investing in colonial securities to move out of them into domestic securities, raising the low colonial interest rates. The evidence on the differential between home and foreign interest rates for securities of similar quality suggests that the common source of funds for home and foreign investment was, in fact, effective in equalizing the rates. Indeed, interest rates for securities abroad were normally slightly higher than securities at home with the same risk.¹

The qualification "with the same risk" requires emphasis. In 1911-13 the average return on all capital at home was more than 10 per cent, while the return on capital abroad was less than 5 per cent.² The capital abroad, however, was held in safe bonds, while the capital at home had to be held on balance in equity. Englishmen owned their own capital stock and the risk of ownership required compensation in the form of a higher return than on the comparative safety of lending abroad. Englishmen who were willing to own capital received, through the leverage of loans from the faint-hearted, a return higher than the 10 per cent return on real capital, while bondholders received a lower return. Some, and perhaps all, of the difference between the return on real capital at home and bond capital abroad, then, was a reward for assuming risk.

Nonetheless, some of the difference may have been the result of imperfections in the capital market. In an imperfect capital market Britain would have gained by bringing some of her capital home. The net gain to national income from eliminating the gap caused by imperfections is represented by the shaded area in the diagram overleaf. The horizontal axis measures for 1911-13 capital at home, capital owned by citizens of the United Kingdom abroad, and foreign capital abroad³ and the vertical axes the marginal products of capital at home and abroad. Income produced at home, since it is the total product of capital at home, is represented by the area under the solid curve of the marginal product of capital, while income from investments abroad, since it is the return on foreign bonds multiplied by the value of foreign bonds owned, is represented by the rectangle whose height is the return on foreign bonds.⁴ The length G represents the

¹ Cf. Cairncross, *op. cit.* pp. 227-31.

² These estimates are based on the home-produced income accruing to capitalists and foreign investment earnings. The return at home agrees with the estimate by E. H. Phelps Brown and B. Weber for the entire period 1870-1912 ('Accumulation, Productivity, and Distribution in the British Economy, 1870-1938', *Economic Journal*, LXIII (1953), 263-88). The underlying capital stock estimates are discussed below.

³ The domestic stock of capital in Great Britain was about £7,900 million in 1911-13, according to Deane and Cole, *op. cit.* p. 274 (based on H. Champion's income method estimate in *Public and Private Property in Great Britain* (1939)). To their estimate I have added £500 million for Ireland (based on the relation between the United Kingdom and Great Britain in 1885 for capital in farming, industry, commerce, and finance (Deane and Cole, *loc. cit.*)). A capital stock of £8,400 million agrees roughly with the estimate of £8,100 million by Phelps Brown and Handfield-Jones, *op. cit.* p. 302. The stock of capital abroad on which Englishmen had a claim was about £4,000 million. This figure can be reached by capitalizing Imlah's yearly overseas investment earnings for 1911-13 (£188 million, Mitchell, *op. cit.* p. 334) at the prevailing interest rate on bonds (e.g. R. A. Lehfeldt's 'The Rate of Interest on British and Foreign Investment', *Statistical Journal* (1913) or American Railway bonds). Alternatively (and with the same result) Imlah's balance of payments on current account can be added year by year to the estimate of Cairncross for 1871 (*op. cit.* pp. 182-4). The relevant amount of foreign capital abroad can be taken at any reasonable magnitude, here £20,000 million, for it affects the results very little.

⁴ The average for 1911-13 of Imlah's foreign investment earnings was £188 million (Mitchell, *op. cit.*

gap between the return on domestic and foreign bonds and is the chief point at issue. A gap of 6 per cent is an upper bound: it would be the true gap from imperfections only if none of the difference between the 10·7 per cent return on physical capital at home and the 4·7 per cent return on bond capital abroad was a premium for the risk of ownership. The gap, therefore, is taken to vary from 1 per cent to 6 per cent. Eliminating the gap would push the bond market to the

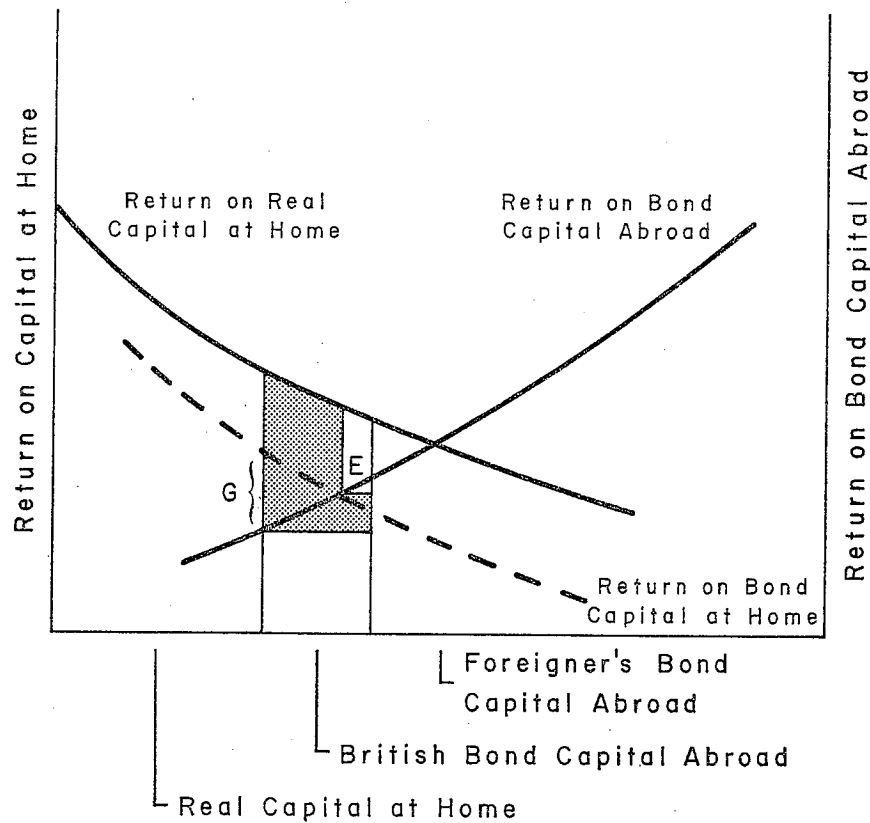


Fig. 1. *The Effect of Eliminating Imperfections in the Capital Market*

equilibrium E, reducing the return on physical capital at home and raising the return on bonds abroad.¹ Subtracting the old income at home and abroad from the new leaves the shaded area as the net gain.

The gain is small, even assuming great imperfections in the capital market, as shown in Table 1.²

p. 274). Subtracting this from Feinstein's net national income estimate leaves £1,980 million home-produced income.

¹ A reasonable estimate of the elasticity of the two curves involved, it can be shown, is the share of non-capital inputs in national income.

² The fall in the net gain for a gap larger than 3 per cent is not paradoxical. As more is borrowed abroad, the terms worsen.

Table 1. *The Effect of Eliminating Imperfections in the Capital Market*

Excess of home interest rate over 4.7% (%)	New capital at home (£ million)	New home income (£ million)	New income from abroad (£ million)	Additional income as % of old (%)
1	2,100	2,180	95	4.5
2	3,940	2,310	nil	6.5
3	5,560	2,420	86	7.3
4	7,040	2,500	178	7.0
5	8,380	2,560	266	5.5
6	9,530	2,600	350	3.5

Source: The procedure was to find the increment to capital at home, using the given data, that equilibrates the bond market. The details of the calculations are available from the author at the Department of Economics, University of Chicago, 1126 East 59th Street, Chicago, Illinois 60637.

The elimination of the largest possible imperfection during the period 1870-1913, even though it would have required enormous capital *imports*, would have raised income by the end of the period by only 7.3 per cent and would only have raised the rate of growth of income from 2.40 per cent per year to 2.58 per cent.

It has been argued that "the City of London and its financial institutions . . . were the greatest single threat to the prosperity of England."¹ The tiny increment to the growth of income from eliminating the threat suggests that this view is false. The United Kingdom exported a huge amount of capital in the period and it is tempting to believe that it could have drawn on this capital as a surplus for growth. In the light of the argument here, the temptation must be resisted.

The demand hypothesis of slower British growth, then, has a grave defect. Meyer's test, though flawed, appears at first to lend it support. But the demand hypothesis, in any form, assumes elastic supplies of labour and capital and these were not available. In late Victorian England there was no reserve army of unemployed, no pool of underemployed agricultural labour, no excessive consumption at home, and no profitless investment abroad. Had exports grown faster, output for domestic use would have grown slower: the total was fixed by the growth of resources and productivity.

III

The allegation of failure, therefore, must rest on slower-growing productivity. The measurement of how effectively an economy uses the resources available to it is a delicate matter with the best of information. With the poor quality of information available on the late Victorian economy, the task has seemed to some too difficult to attempt. They have passed on to reasons why Britain failed, taking as proven the fact of failure. It is not surprising that they have eschewed measurement, for the measures have given conflicting opinions on the course of pro-

¹ P. Rosenstein-Rodan at the International Economic Association conference on *Capital Movements and Economic Development* (1967), p. 68. The rapporteur says that Rosenstein-Rodan "drew attention to the major increase in the scale of British overseas investment during the few decades before World War I, and added that if this capital had been invested in England, England would have been much stronger." In the discussion, G. Leduc makes the same point about France. One of the papers they are discussing, B. Thomas' 'The Historical Record of International Capital Movements to 1913', concludes with a similar argument, but applies it, guardedly, only to the years 1900 to 1913.

ductivity change. One group, using Prest's deflated national income data, places the climacteric of productivity in the 'nineties while the other, using Hoffmann's index of industrial output, places it in the 'seventies. D. J. Coppock was the first to notice the divergence between the measures of national income and of industrial output. Remarking that "between 1875 and 1900 the two series are quite contradictory",¹ he chooses the industrial series and the earlier climacteric. C. Wilson leans the other way, but is disturbed by "the gap between the *apparent* slackening of economic growth and the better substantiated estimates of rising aggregate national income, a conundrum to which no really satisfactory answer has been given".²

The alleged conundrum is that industrial output grew slower than national income: Hoffmann's index grew at around 1.7 per cent per year from 1872 to 1907, while real national income was growing at 2 per cent or more per year. The coverage of the Hoffmann index, however, is surely smaller than the income estimates and the missing sectors may well have been growing faster.³ Moreover, Hoffmann's index is essentially a gross output index. That is, although it uses value-added weights the basic data are gross, not net, outputs of the commodities. Hoffmann's index is not an index of national income originating in industry, as those who are puzzled by its lack of identity with national income appear to believe. By the argument developed earlier, therefore, Hoffmann's index *must* grow slower than national income: gross output and final output can grow at the same rate only if productivity change in the sense of a fall in the interindustry coefficient is nil.⁴ There is, in short, no conundrum: there is no clear contradiction between Hoffmann's index and real income.

Coppock attempted to explain the divergence between Hoffmann's index and the measures of real income of Phelps Brown and Handfield-Jones⁵ by arguing that the deflator of national income was too heavily weighted towards food and raw materials. Food and raw material prices were more volatile than more representative commodities, he said, falling faster before 1896 and rising faster after 1896, with the result that a change in trend of real national income appears in the 'nineties.⁶ This criticism rests on an inappropriate set of weights for a price index of output. Noting that the weight on food in the Phelps Brown and Handfield-Jones price index is about 36 per cent, for example, he remarks that "it is obvious that the output of food bore no such relationship to national output."⁷ The evi-

¹ Coppock, *op. cit.* p. 4.

² C. Wilson, 'Economy and Society in Late Victorian Britain', *Economic History Review*, 2nd ser. xviii (1965), 193 (italics his).

³ The coverage of the Hoffmann index is, of course, good. But a non-random sample, however large, yields biased estimates of the population characteristics. Wilson, *op. cit.*, makes a convincing case that "miscellaneous industries and incorporeal functions" (as Giffen called them) were growing rapidly in this period. He mentions soap, retailing, and bicycles.

⁴ Coppock's assertion that "a growth of some 0.5% or less per annum in industrial productivity [i.e. Hoffmann's index per man] cannot explain a growth of some 1.5% to 2.0% per annum in real income a head" (*op. cit.* p. 14) is, therefore, mistaken. There is no inconsistency between Hoffmann's index and the real national income estimates.

⁵ *Op. cit.*

⁶ A similar point was made by J. F. Wright in his review article on Deane and Cole, 'British Economic Growth, 1688-1959', *Econ. Hist. Rev.* 2nd ser. xviii (1965), 397-412. Their use of Rousseaux's price index to deflate national income, he argues, produced a false rejuvenation of real national income after 1870.

⁷ *Op. cit.* p. 16.

dence is the low share of income earned in agriculture. Income earned in an industry, however, is the sum of the rewards to labour, capital, and land inputs and is not in general equal to the sum of final expenditures on the product of the industry. It is not necessarily true that "what is relevant for a price index of final products is outputs not expenditures."¹ It appears from the context that Coppock means value added when he speaks of "outputs". With perfect data, prices weighted by expenditures shares would give exactly the same income deflator as prices weighted by value-added shares. There are no grounds for preferring one or the other, except when the data have been collected in one or the other fashion. In fact, because there are good indexes of final expenditure prices available (e.g. Bowley's cost of living index for consumption, Feinstein's gross investment deflator for investment, Imlah's export price index), it is convenient to construct a price index with final expenditure weights. It is the weight of each industry's product in final expenditure (gross national product) that the index of Phelps Brown and Handfield-Jones aims to reflect. Ironically, when after 1900 consumption data by product become available, they show that food, drink, and tobacco were almost exactly the 36 per cent of gross national product that Coppock believed was obviously too high.²

It is entirely appropriate, then, to use national product estimates, with their heavy weight on food, for measuring productivity. The table below gives some estimates of the home-produced gross national product of the United Kingdom for ten-year intervals from 1860 to 1910. The estimates of real gross national product were made by adding together the expenditures in the prices of 1900 by consumers, investors, government, and the rest of the world.

Table 2. *Real Gross National Product*

	Money G.N.P. £ million	Real G.N.P. £ million 1900 prices	Implicit price index	Growth-rate per year of real G.N.P. (% in previous decade)	Hoffmann's index of industrial output	Growth-rate per year of Hoffmann's index (%)
1860	841	720	116.7			
1870	1,156	999	115.7	3.27	34.2	
1880	1,349	1,233	101.3	2.11	43.4	2.38
1890	1,500	1,634	91.7	2.82	54.2	2.21
1900	2,037	2,037	100.0	2.19	65.5	1.91
1910	2,265	2,211	102.5	0.806	77.1	1.62
					86.5	1.14

Source: Details of the estimating procedures available from the author on request. Consumption for 1860-90 is based on the series of J. B. Jeffreys and D. Walters (in S. Kuznets, ed. *International Association for Research in Income and Wealth, Income and Wealth, Series V* (1955), p. 27), deflated by Bowley's index of the cost of living. Consumption for 1900-10 is based on D. A. Rowe's series given in Mitchell, op. cit. p. 371. Gross investment in 1900 prices is Feinstein's series (ibid. p. 373) and government expenditure is the estimate given by A. T. Peacock and J. Wiseman, *The Growth of Public Expenditure in the United Kingdom* (Princeton, N.J., 1961) at pp. 37 and 42. Real exports of commodities and invisibles minus real imports are based on Imlah's estimates (Mitchell, op. cit. pp. 331-3).

¹ Coppock, loc. cit.

² The consumption data are D. A. Rowe's, in Mitchell, op. cit. p. 370. The estimates of gross national product are Deane and Cole's in op. cit. p. 332. They are the sum of Rowe's consumption estimates and estimates of domestic fixed investment, net foreign investment, and public authorities expenditure. Food, drink, and tobacco expenditures were 36.3 per cent of gross national product from 1900 to 1909.

The striking feature of the growth of real product is its rapid growth before 1900 and its sharp deceleration afterwards. Unless the pattern of growth of inputs explains this break, the climacteric should be placed not in the 'seventies or 'nineties but in the 1900's. The growth of the relevant inputs, labour and capital, is exhibited in the next table.

Table 3. *Capital, Labour, and Productivity*

	Domestic capital value in 1900 prices (£ million)	Capital growth- rate per year (% in previous decade)	Labour (000's employed year after)	Labour growth- rate per year (%)	Productivity growth-rate per year (%)
1860	3,732		11,678		
1870	4,316	1.44	13,064	1.115	2.160
1880	5,057	1.60	14,450	1.025	0.872
1890	5,708	1.24	16,020	1.025	1.750
1900	6,657	1.54	17,740	1.025	0.982
1910	7,713	1.47	19,700	1.045	-0.383

Source: Details available from the author on request. The capital estimate is a decumulation of J. C. Stamp's estimate of the domestic capital stock (*British Incomes and Property* (1916), p. 404) by Feinstein's net fixed investment series (loc. cit.) and an estimate of inventory investment. Stamp's and Feinstein's estimates were adjusted for comparability. The labour series is an estimate given in Phelps Brown and Handfield-Jones, op. cit. p. 298. For the method of estimating the shares of labour and capital in home-produced income see above, p. 450, n. 2.

Both inputs are necessary for a meaningful measure of productivity: it is not appropriate, for example, to use the growth of output per man to draw inferences about the performance of the economy or a sector of it. Not surprisingly, the growth of the inputs is relatively steady, labour growing at about 1.05 per cent per year and capital at 1.45 per cent per year during the period. The last column shows the resulting measure of productivity change, that is, the growth of real product not attributable to the growth of capital or labour. Once again, there is a sharp deceleration after the turn of the century.

More important, however, is the sustained growth of productivity in the 'seventies, 'eighties, and 'nineties, for it was during these years that the conviction grew on Englishmen that they were falling behind the technology of Germany and, especially, the United States. As far as can be ascertained, however, productivity growth in the United States was of the same order of magnitude as in the United Kingdom: rates of 1 or 1.5 per cent per year are typical of the American as of the British economy at the time.¹ Given the uncertainties of the data for both countries, the most precise defensible statement is that there was little cause for alarm in the behaviour of British productivity.

The case for a late Victorian failure in productivity, then, appears weak. Indeed the failure, to be precise, was Edwardian. Nor is there any evidence that productivity responded to the growth of exports: real exports grew faster in the decade and a half before the First World War than they had since the 'sixties, yet productivity declined. Moreover, the correlation between capital accumulation

¹ J. W. Kendrick, for example, finds that productivity change averaged about 1.5 per cent per year from 1869 to 1909 in the United States. There are some difficulties with the data for 1869 and 1879. From 1889 to 1909 the measure averages about 1.3 per cent per year. See *Productivity Trends in the United States* (Princeton, N.J., 1961), p. 331.

and productivity change on which the demand theory of British failure rests is poor: capital accumulation was low in the 'eighties, for example, yet productivity growth was rapid.

A measure of productivity growth using national aggregates of output, labour, and capital, however, is a fragile foundation on which to erect theories of British success or failure. This is not because of the large size of the uncertainties in the data, although those compound the problem. The difficulty is that even with very good data the range of doubt in the result is large. This is a general problem and applies to the measure of productivity change used here as well as to the conceptually less complete measures used elsewhere. For example, the measure of productivity grew at 1.2 per cent per year from 1870 to 1900, a respectable pace. If the estimates in 1870 and 1900 of real gross national product, the stock of capital, the labour force, and the shares of capital and labour in national product are incorrect by as little as ± 3 per cent, however, the resulting estimate of productivity change will range from 0.77 per cent per year to 1.62 per cent, that is, by comparison with the United States, from failure to success.

The case for failure or success in the growth of productivity must rest ultimately on international comparisons of productivity in specific industries, not on the aggregate measures about which the controversy on British economic performance has hitherto revolved. The measure for each industry, of course, will be open to the same criticism, but if the errors for each industry are independent a set of many industry studies will constitute a sample of British behaviour from which more reliable inferences can be drawn. For the present, it is enough to show that the aggregate measures are consistent with success.

IV

It is implausible, then, to draw the lines of causation in late Victorian England from export demand to the output of the economy. The thesis expressed here is that the resources available to the economy were not elastic in supply and reallocation of them (capital abroad, for example) would have brought little or no additional growth. The growth of output depended on how productively the available resources were used. The measure of productivity suggests no great failure of Britain on this score. There was a dip of productivity in the 1900's, but it was too short, too late, and too uncertain to justify the dramatic description "climacteric". Nor does it support the notion that British businessmen were marking time from the 'seventies onward.¹ There is, indeed, little left of the dismal picture of British failure painted by historians. The alternative is a picture of an economy not stagnating but growing as rapidly as permitted by the growth of its resources and the effective exploitation of the available technology.

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¹ D. Landes, for example, asserts that "There is no doubt, that British industry was not so vigorous and adaptable from the 1870's on as it could have been."—Op. cit. p. 559.