

# ***“In the Service of the State”?***

## ***Profitability in the British Armaments Industry, 1914-24***

**A. J. Arnold \***

University of Essex, Colchester

The relationship between a nation-state and its domestic economy is complex and interactive. States attempt both to provide benefits to major economic interests and to utilise the strength of their host economy in order to achieve their own objectives. Governments have considerable powers to make rules, to exercise control through physical force and to raise taxes in order to make these functions effective<sup>1</sup> although, in an economy in which capital is owned privately, the theoretical powers of the state are limited in reality by ‘the control of business over capital, production capacity and economic information and the control of unions over labour’<sup>2</sup>.

The key functions of the state, at least until the end of the period under review, have been military in nature and government policies towards the domestic economy have generally reflected

\* I would like to thank Vickers Shipbuilding and Engineering Ltd for access to their archival collections at Barrow-in-Furness and Cambridge University and Tyne and Wear Archives for permission to use their archives on Vickers Ltd and Sir W. G. Armstrong Whitworth and Co. Ltd.

<sup>1</sup> See M. Mann, *States, War and Capitalism*, (Oxford, 1988), p. 4; (eds.) H. H. Gerth and C. W. Mills, *From Max Weber: Essays in Sociology*, (1948), p. 78; S. Clegg, *The Theory of Power and Organisation*, (1979), pp. 83-4; F. van Winden, *On the Interaction between State and Private Sector*, (Amsterdam 1983), p. 1.

<sup>2</sup> W. Grant, J. Nekkers and F. van Waarden, (eds). *Organising Business for War: Corporatist Economic Organisation during the Second World War*, (Oxford 1991), p.8.

<sup>3</sup> See A. H. John, ‘War and the English Economy 1700-63’, *Economic History Review*, Vol. VII (1955) pp.340-4; C. Vogler, *The Nation State: the Neglected Dimension of Class*, (Aldershot 1985) p.64; R. Gilpin, *War and Change in World Politics*, (Cambridge, 1981) p.129, p.138; G. Sen, *The Military Origins of Industrialisation and International Trade Rivalry*, (1984), p.74; P. Dunne, ‘The Political Economy of Military Expenditure: an Introduction’, *Cambridge Journal of Economics* Vol. 14 (1990), pp.395-404; (R) C

perceptions of their own strategic interests.<sup>3</sup> During war, inevitably this intensifies and is supported by an increase in the power and legitimacy of the state as the 'obvious agency to meet the need for ordering, regulation and mobilisation'.<sup>4</sup>

The First World War in particular transformed the relationship between the British state and firms in the private sector; previously, the 'intervention of the state in economic affairs was important but restricted' whereas, by 1918, state expenditures absorbed 52% of GNP and 'two-thirds of the economy and nine-tenths of imports were subject to direction by bodies authorised by government'.<sup>5</sup>

Previously, the state had carried on a 'special relationship' with firms in a number of trades in the private sector and had placed orders with them, partly so as to obtain arms and naval tonnage more cheaply and partly in order to develop spare capacity in the private sector.<sup>6</sup> During the war itself, however, the demands of the British government for war materials on a scale far beyond the capabilities of the state munitions factories and dockyards meant that an even stronger relationship was bound to develop between the armaments firms and the government.

Trebilcock, 'A "Special Relationship" - Government, Rearmament and the Cordite Firms', *Economic History Review*, Second Series, Vol. XIX (1966) No 2, pp. 364-79; C. Trebilcock, 'British Armaments and European Industrialisation, 1890-1914', *Economic History Review*, Second Series Vol. XXII (1969) pp. 254-72; C Trebilcock, "'Spin-Off" in British Economic History: Armaments and Industry, 1760-1914', *Economic History Review*, Second Series, Vol. XXVI (1973) pp. 474-90; C Trebilcock, 'Science, Technology and the Armaments Industry in the U K and Europe, with Special Reference to the Period 1880-1914', *Journal of European Economic History*, Vol. 22 (1993) pp. 565-80; W. Lazonick, *Business Organisation and the Myth of the Market Economy*, (Cambridge 1991), p.5; W Ashworth, 'Economic Aspects of Late Victorian Naval Administration', *Economic History Review*, Second Series, Vol. 22 (1969) pp.491-505.

<sup>4</sup> Grant, Nekkers and van Waarden, *Organising Business*, p. 7.

<sup>5</sup> R. H. Tawney, 'The Abolition of Economic Controls, 1918-1921', *Economic History Review*, Second series, Vol. XIII (1943) p. 1; M W Kirby and M B Rose, "Productivity and Competitive Failure: British Government Policy and Industry 1914-19", in G. Jones and M. W. Kirby (eds.), *Competitiveness and the State*, (1991), p. 20; P. J. Cain and A G Hopkins, *British Imperialism: Crisis and Deconstruction 1914-1990* (1993), p. 49.

<sup>6</sup> See Trebilcock, 'A Special Relationship' and A J Arnold, 'Commercial Returns from the "Special Relationship": Naval Ordnance Profits in the Private Sector, 1897-1914', *Working Paper* (96/13), Department of Accounting and Financial Management, University of Essex, April 1996.

There has been some discussion in the literature of the effects of war-time policy on society and organised labour<sup>7</sup> and of the mechanisms used by the British government to drive down the unit costs of war materials<sup>8</sup> but very little appears to be known of the combined effects of governmental demand and policy during the First World War on the profitability of firms in the private sector in general, or on armaments firms in particular. This is the more surprising because profitability has important effects upon business investment, because the First World War appears to have had important structural effects upon the British economy<sup>9</sup> and because profitability, under the description 'profiteering', had enormous political importance throughout the period of the war.<sup>10</sup>

In the first part of the twentieth century, there were eight major firms in the arms industry but two, Vickers and Armstrong Whitworth, were dominant and operated as world leaders in the industry<sup>11</sup>. They were also centrally involved in the war-time negotiations between the state, the business sector and the representatives of organised labour, in which the state obtained the agreements on working practices and profit restraints necessary to increase the output of munitions.

The actions and motivations of the two firms have been viewed with suspicion over a long period of time, because of the potential conflict between profit maximisation and patriotism, leading to

<sup>7</sup> See for example, B. Waites, *A Class Society at War: England 1914-1918*, (Leamington Spa, 1987); G. R. Rubin, *War, Law and Labour: the Munitions Acts, State Regulation and the Unions, 1915-21*, (Oxford 1987).

<sup>8</sup> See A. Loft, 'Towards a Critical Understanding of Accounting: the Case of Cost Accounting in the U K, 1914-25', *Accounting Organisations and Society*, Vol. 11 (1986) No 2, pp. 137-69.

<sup>9</sup> See L. Hannah, *The Rise of the Corporate Economy*, Second Edition, (1983)

<sup>10</sup> Profiteering became a highly public problem in February 1915, but even in the summer of 1917 it was the main cause of government enquiries into industrial unrest; see *Economist* 20 February 1915 p. 306; *The Times* 22 March 1915 p. 9; *The Times* 23 March 1915 p. 5; British P.P., *Summary of the Reports of the Commission of Enquiry into Industrial Unrest (1917-18)*, Cmd 8696 XV; *New Statesman* 28 July 1917 p. 388.

<sup>11</sup> In P. L. Payne, 'The Emergence of the Large-Scale Company in Great Britain, 1870-1914', *Economic History Review*, Second Series, Vol.20 (1967), p. 539 they are ranked on the basis of capital as the 6th and 11th largest firms in the British economy in 1905.

accusations that they operated as 'Merchants of Death', indulged in 'profiteering' and also usurped the legitimate functions of the state<sup>12</sup> but, despite this, there seems to be very little reliable information about the profit levels that the two firms were able to achieve, particularly during the pressurised circumstances of the First World War, although there have been a number of books or articles written about various aspects of their evolution as businesses.<sup>13</sup>

The purpose of this paper is to analyse the profitability of the two major armaments companies, Vickers Ltd and Sir W G Armstrong Whitworth and Co. Ltd, across the trans-war period 1914-24, based upon publicly available, secondary and archival material, in order to provide evidence on the benefits of war to firms in an industry central to the war economy and on the nature of the interactions between the state and the business sector during the trans-war period.

## 1. The State and the Business Sector during the First World War

For most countries the war, as a military-political event, lasted from 1914 to 1918 but, for purposes of economic analysis, it is normal to look to a broader trans-war period which starts and finishes at an equivalent point in the trade cycle.<sup>14</sup>

<sup>12</sup> See D. G. Anderson, 'British Rearmament and the "Merchants of Death": the 1935-36 Royal Commission on the Manufacture of and Trade in Armaments', *Journal of Contemporary History*, Vol. 29 (1994), p. 15, p. 28-30; P Noel-Baker, *The Private Manufacture of Armaments*, (1936), pp. 131-83 and, albeit with some caution, F. Brockway and F. Mullally, *Death Pays a Dividend*, (1944) and H. C. Engelbrecht and F. C. Hanighen, *Merchants of Death*, (1935). Their record has, however, been defended by C. Trebilcock in for example "The British Armaments Industry 1890-1914: False Legend and True Utility", in G. Best and A. Wheatcroft (eds.), *War Economy and the Military Mind*, (London 1976), pp. 89-107. See also the *Royal Commission on the Private Manufacture of and Trading in Arms: Report (1935-6)*, British P.P. Cmd 5292 Minutes of Evidence, pp.534-8, 748-50.

<sup>13</sup> J. D. Scott, *Vickers: a History*, (1962) p.155; R. J. Irving, 'New Industries for Old? Some Investment Decisions of Sir W. G. Armstrong Whitworth and Co. Ltd 1900-14' in R. P. T. Davenport-Hines (ed.), *Capital, Entrepreneurs and Profits*, (1990), pp.273-98; C. Trebilcock, *The Vickers Brothers: Armaments and Enterprise 1854-1914*, (1977)

<sup>14</sup> See, for example, R. C. O. Matthews, C. H. Feinstein and J. C. Odling-Smee, *British Economic Growth 1856-1973*, (Oxford, 1982) and S. Broadberry, 'The Impact of the World Wars on the Long Run Performance of the British Economy', *Oxford Review of Economic Policy*, Vol. 4 (1988), No 1, pp.25-37.

The war did not have a consistent impact over time on the business sector. In 1914, the British intention was to use the navy to blockade Germany while their economy supplied the allies with the munitions they would need in the land war, so that 'safe behind the Royal Navy, Britain would be able to pursue her proper strategic role as the economic powerhouse of the Entente'<sup>15</sup> but, by early 1915, it was apparent that the blockade of Germany had failed, that the French and Russian governments were dissatisfied at British contributions to the balance of sacrifice and that the various governments were no longer facing a brief 'war of movement'.<sup>16</sup> The initial policy of 'business as usual' meant that the increase in demand for war material was more gradual than it might otherwise have been but when, in 1915, the state accepted the necessity to move towards a 'total war economy' the demand for armaments of various types grew to unprecedented levels and led the government into new arrangements with the major interest groups in the economy.

The powers available to national governments can, following Mann, be characterised as either 'despotic' or 'infra-structural'.<sup>17</sup> During the First World War the British state used an unprecedented range of compulsory measures. The passing of the Defence of the Realm Act (DORA) in August 1914 provided wide powers to 'ensure the public safety and the defence of the realm' against a potential armed invader; during the war the state also came to assert a wide-ranging set of rights over individuals and economic activity, including the introduction of military conscription, requisitioning the goods it required, controlling entire trades and proclaiming the right to 'claim the services of any citizen'.<sup>18</sup> Absolutist theory was invoked, giving the state the right to possess private property through Royal Prerogative and to pay compensation only as an 'act of grace'. Some of the measures

<sup>15</sup> D. French, *British Economic and Strategic Planning, 1905-1915* (1982), pp.16, 23.

<sup>16</sup> *Ibid.*, p.16.

<sup>17</sup> M. Mann, *The Sources of Social Power*, Volume II: *The Rise of Classes and Nation-states, 1760-1914* (Cambridge 1993) pp.59-61.

<sup>18</sup> Suggested to the Cabinet on 16 June 1915 by Austin Chamberlain; K Middlemas, *Politics in Industrial Society*, (1979), p.83.

adopted were given legal status by DORA and its enabling regulations, although some had only the most remote connection with the contingencies envisaged in that Act and were, therefore, probably *ultra vires*.<sup>19</sup>

These powers of compulsion were highly significant, but the critical element in the relationship between the state and firms in the private sector was probably the use of the state's infra-structural power from 1915, through the process of institutionalised negotiation. This represented the beginnings of corporatism<sup>20</sup> and brought a new politicisation and importance to the 'profit' concept.

The government passed the Defence of the Realm (Amendment) No. 2 Act on 23 February 1915, which extended the powers of the state to the possession of munitions works and the control of works that were not taken into possession, but it was more limited in scope than it appeared; 'possession' was directional rather than operational, as the government did not have the expertise to supersede existing groups of managers, and it did nothing to remove restrictions on output or to regulate profits. These were the two major and related issues affecting operations in the private sector; organised labour did not intend to relax traditional working practices, particularly on non-war work, to benefit returns to the owners of capital while companies would require incentives to use their (privately-owned) facilities for the benefit of the state.

Initially, the government believed that the principal armament (and shipbuilding) firms should be compensated for the 'interference to their business' by the state, a position which relied upon a relatively straight-forward and apolitical view of the economic cycle facing arms manufacturers; under peace-time conditions, work levels would be reduced and profits rather thin but during times of war, trade and profitability were bound to increase to provide compensation for this. The government at first

<sup>19</sup> S. J. Hurwitz, *State Intervention in Great Britain*, (1968), pp. 51-64, 151-2.

<sup>20</sup> Middlemas, *Politics in, War, Law and Labour*, A. Cawson, 'Pluralism, Corporatism and the Role of the State', *Government and Opposition*, Vol. 13 (1978) pp. 178-98

saw this as taking the form of a guaranteed minimum profit, the same return on capital employed as obtained before the war, together with a share in further profits, which would have been generated by, for example, a war between continental powers.<sup>21</sup>

The government accordingly suggested that any excess profits should be divided between the state and the firm concerned and were in favour of the company, out of their profits, 'considering the claims of their workforce for greater devotion to duty' on a discretionary basis but opposed to any announcement that defined parts of the profit would be paid to the workforce, as this would

'create difficulties at Woolwich and other government works, since the treatment of employees should so far as the government was concerned, be as uniform and consistent as possible'.<sup>22</sup>

The government's initial views on company profit levels were modified, however, by considerations set out in a 'Memorandum on Labour Unrest', circulated in late February by the Chairman of the Committee on Production, which concluded that workers would claim the freedom to increase wages, which they were strongly placed to enforce, in the face of rising food prices and the large profits that companies were believed to be making unless 'they could be satisfied that some control was being exercised over contractors to minimise their profits'.<sup>23</sup>

When, in mid-March, the representatives of Armstrongs and Vickers rejected 'control by government supervision' and the related assumptions concerning the guaranteeing of profit levels, and suggested instead that, in order to

'eliminate any suggestion of abnormal profits, all contracts from 1 March 1915 should provide profits at the same ratio to selling value as in normal years',

the political context had changed and the government were quick

<sup>21</sup> *History of the Ministry of Munitions*, Vol. 1, *Industrial Mobilisation*, (1922), p.69. There were also earlier discussions on dividend limitations during and for a period after the war; Scott (1962) p.129.

<sup>22</sup> *Ibid*, p.72.

<sup>23</sup> *Ibid*, p.69.

to reject this as unreasonable in the context of the greatly increased demand for munitions.

Instead, agreement was reached on an over-riding limitation on profits, after special depreciation for war work, (i.e. for additional wear and tear and for 'such capital expenditure as has been incurred by the companies for the output of war material') of 20% over and above the level as shown in the two previous year's accounts, with any further profits being used to reduce prices or add to government revenues but not to the pay of employees.<sup>24</sup>

More substantial increases in munitions output could, however, be achieved by reaching agreement with the unions on 'dilution', the use of unskilled or semi-skilled workers in jobs previously reserved for trained craftsmen holding union cards, and a dispute at Vicker's Crayford works in November 1914 led to the talks between the Engineering Employers Federation, the engineering unions and the state and then to the recommendations of the (Askwith) Committee on Production in favour of dilution, the suspension of the right to strike, compulsory arbitration through the agency of the state, the suspension of various restrictive practices for the period of the war, the maintenance of wage-levels (including under piece-work arrangements) and the monitoring of profits by the government in order to prevent war profiteering.<sup>25</sup>

The Treasury conference, from 17-19 March 1915, then reached agreement on the 'Acceleration of Output on Government Work', although continued rises in food prices and concerns amongst employees over corporate profit levels led to a break-down in the industrial truce and to the refusal of the influential Amalgamated Society of Engineers (ASE) to endorse the Treasury Agreement without further discussions with its membership. A second conference took place at the Treasury on 25 March, at which the ASE settled, and that summer a commitment was given to tax excess profits followed by the passing of a Munitions of War Act,

<sup>24</sup> Ibid, p.75.

<sup>25</sup> R. J. Q. Adams, *Arms and the Wizard: Lloyd George and the Ministry of Munitions 1915-1916*, (1978), p.182.

which incorporated the recommendations of the Askwith Committee and limited the profits of controlled munitions firms to their pre-war level plus one-fifth.

Schmitter has distinguished 'societal' from 'state' forms of corporatism, the latter existing when the 'initiative and locus of control is heavily on the side of the state'.<sup>26</sup> Although the negotiations between the state and the major interest groups in the British economy can be described as 'corporatist', it is important to distinguish Middlemas's view of this as a new (and persistent) 'form of harmony in the political system' from Rubin's emphasis on the temporarily 'directive role of the state' and view of the British government during the First World War as a 'bureaucratic elite intent on advancing its conception of the national interest and on disciplining both capital and labour to achieve its goals', a perspective far more consistent with Schmitter's notion of state corporatism.<sup>27</sup> The government was also not neutral as between capital and labour. It was an employer in its own right in the arsenals and munitions factories of the public sector and, in negotiations with Armstrongs and Vickers, its opposition to any sharing of excess profits with company workers, due to the 'difficulties' this would create at Woolwich and other government works, was clearly partisan. The neutrality of arbitration processes on wage disputes was also impeached by the government's statement in November 1915 that 'any further advance in wages should be strictly confined to the adjustment of local conditions where such adjustments are proved to be necessary'.<sup>28</sup>

During the First World War two new taxes on business profits were introduced, as part of the negotiations between the state and the major interest groups in the economy, the Munitions Levy (ML)

<sup>26</sup> P. C. Schmitter, 'Still the Century of Corporatism?', *Review of Politics*, Vol. 36, (1974), No 1, p.103.

<sup>27</sup> Middlemas, *Politics in*, pp.18-20; Rubin, *War, Law and Labour*, pp.11-13, 260.

<sup>28</sup> *History of the Ministry of Munitions*, Vol. IV, *The Supply and Control of Labour 1915-16*, (1922), p.128.

and Excess Profits Duty (EPD), which jointly provided £1156M or 22% of the state's revenues in the period 1915-21.<sup>29</sup>

The Munitions Levy (or Munitions Exchequer Payment) was introduced by the Munitions of War Act 1915, which was intended to 'further the efficient manufacture, transport and supply of munitions', as a tax of 100% on the profits of munitions businesses 'controlled' under the Act to the extent that they exceeded 120% of standard profits (normally the average of the net profits of the two financial years prior to the war).<sup>30</sup> Controlled firms were entitled to special allowances for increased capital inputs, for capital expenditures specific to munitions work and for the exceptional wear and tear of assets.

Excess Profits Duty was introduced in the same year, under Part III of the Finance (No 2) Act 1915 and applied to businesses in general, although firms in the munitions industry were liable initially to both the ML and EPD. Under the Finance Act 1916, section 48, liability was, however, limited to the higher of the two levies while the Finance Act 1917, section 24 merged EPD and the ML, with the Inland Revenue taking over administration of the ML from the Ministry of Munitions. A further link between the various forms of taxation was that the liability of firms to taxation under Income Tax, Schedule D, was based upon their profits after the deduction of EPD liabilities.

EPD was levied on the profits of businesses carried on in the UK to the extent that they exceeded either a standard profit, normally the average of any two of the three years preceding the first chargeable year or, at the taxpayer's option, a specified percentage on capital invested in the business. Profits were generally as determined for Income Tax purposes, which meant that gains from asset appreciation (other than trading stocks) were

<sup>29</sup> A third tax, Corporation Profits Tax, was introduced in the Finance Act 1920, as a levy on the profits of limited companies, and abolished in 1924. It was levied at 5% between January 1920 and June 1923, at half that rate for one further year, and raised £98M.

<sup>30</sup> R. M. Haig, 'The Taxation of Excess Profits in Great Britain', *American Economic Review: Proceedings* (December, 1920), Supplement, p.6.

ignored. There were, however, restrictions on directors' and managers' remuneration and allowances for obsolescence. EPD was levied on the profits of seven accounting years, from August 1914, at rates of between 40% and 80%.

The ML and EPD did not, however, raise as much revenue as might have been expected from the official rates of tax. The average EPD rate of 63% was reduced through exemptions and repayments to an overall rate of about 34% while the ML had yielded only £50M by 1924, which Hicks et al described as a 'fantastically small sum'.<sup>31</sup>

There were a number of schemes for relief which reduced the take from EPD, particularly during the immediate post-war period, after the economy went into recession, but probably the most important provisions were those relating to obsolescence under Section 40 (3) of the Finance (No 2) Act 1915. These provided relief for the postponement or suspension, as a consequence of the war, of renewals or repairs, for the exceptional depreciation or obsolescence of assets employed in a business on war work and for the costs of providing plant which would not be wanted for the purposes of trade after the end of the war.

These offered relief for value diminutions against the profits of the entire war period and, as claims could not be finalised until post-war values were established, most claims were deferred until the war was over. It is also clear from internal Inland Revenue papers that the Board of the Inland Revenue asked its Inspectors of Taxes to give particular attention to claims for increased wear and tear allowances, to give all facilities to taxpayers who wished to take their case to appeal and, in difficult cases, to err on the side of generosity.<sup>32</sup> Moreover, the Minister for Munitions offered 'special terms for depreciation' to encourage firms to expand their munitions supply and these undertakings were honoured even after munitions firms

<sup>31</sup> J. R. Hicks, U. K. Hicks and L. Rostas, *The Taxation of War Wealth*, (Oxford, 1941), p.72, p.89. See also Haig, 'The Taxation of', p.55; S. Pollard, *The Development of the British Economy 1914-50*, (1962), p.64.

<sup>32</sup> Public Records Office, Inland Revenue Paper, Minutes of Meeting 18 June 1917, IR 74/231 (1917), para 9; Inland Revenue Paper, Instructions to HMIT on Excess Profits Duty, IR 78/25 (1920), para 479.

were brought within the scope of EPD, and under the control of the Inland Revenue.<sup>33</sup>

The state's policies during the First World War were critical to the profitability of the major armaments firms, although the individual policies had conflicting effects. It is not easy to predict on an a priori basis the overall level of the benefit to these firms, although a number of observations are possible. The state's powers of compulsion and negotiation generally operated in a manner supportive of producer interests. The central aim of state policy was the control of labour, through the removal of restrictive practices, particularly concerning skilled labour and the regulation of wage levels, and the limitations that were placed upon employers were those that were necessary to achieve that end.<sup>34</sup> The state's support for profit limitation was, accordingly, pragmatic rather than instinctive or ideological and overcame the initial view that businesses deserved enhanced profits as compensation for the interference in their business by the state only after warnings from the Committee on Production that the workers were well placed to achieve substantial wage increases.<sup>35</sup> The level of profit limitation eventually adopted was precisely that suggested by Armstrongs and Vickers to the government in the middle of March 1915 although, alternatively, the state had no desire to increase its expenditure and tax requirements beyond what was necessary, prompting Albert Vickers to complain that they 'only think of how to pay out as little money as possible'.<sup>36</sup>

## 2. Financial Accounting Practices and Disclosures

Profit figures or trends are essentially unsatisfactory as indicators of performance, because they ignore changes in

<sup>33</sup> Haig, *The Taxation of* pp.54-5. Inland Revenue allowances to munitions firms for the depreciation in value of war-time installations of plant and machinery amounted to 'about £100M'; Public Records Office, Chancellor of the Exchequer's Private Office Paper (T 172/1281), op.cit.

<sup>34</sup> *History of the Ministry of Munitions, Vol. 1, (1922)*, Part IV, p.1.

<sup>35</sup> *Ibid*, Vol. 1, Part II, p.69.

<sup>36</sup> Scott, *Vickers*, p.131.

capital inputs, whereas profitability provides a suitably relative measure of the return on capital employed. The measurement of profitability involves identifying both the level of profits achieved and the capital employed to generate those profits. In any 'continuous-process' business, however, profit can be only an approximation as profit figures become certain only when particular business processes are complete and the cash-to-cash cycle has been concluded.

Capital can be defined in a number of ways, each of which focuses on some specified contributor or group of contributors of capital. There is merit in contrasting a broad measure of capital, such as the total of interest and dividend-earning funds, with one focused on the return to the ultimate bearers of risk, equity shareholders, although any definition of capital requires the measurement of the assets (less external liabilities), whose value is inherently uncertain. Nonetheless, when profits are divided by capital employed, the resulting figures do provide the most tangible indicator possible of organisational performance.

These calculations can be based upon a number of sources of information. The most accessible, but the least satisfactory, are the published Annual Reports of the companies concerned. During the first quarter of the twentieth century, the disclosure requirements placed on limited companies were very limited; no particular format for reporting was prescribed, there were no specific regulations governing the contents of the accounting reports and a Profit and Loss Account was still not legally necessary.

There were also two more specialised practices which tend to distort the signals provided of organisational performance. The first, depreciation, was widely established, if inconsistently applied during the early part of the twentieth century; as there was no consensus that the charging of depreciation was a necessary as opposed to a desirable annual practice, rates of charging were correspondingly variable. Directors preferred to 'retain a significant element of discretion concerning the amount of the charge, particularly when

profits were low'<sup>37</sup> although Edwards and Boyns concluded, from an examination of the archival records of several firms in the iron and steel industry, that there was 'no real evidence that any systematic attempt was made to mislead external users by manipulating the trend of reported profit', despite low levels of disclosure; instead the main objective appeared to be 'to give financial effect to a cautious financial policy and retain money within the business for re-investment'.<sup>38</sup>

The other major accounting problem of the early years of the twentieth century was secret reserve accounting, whereby companies in unusually good years either hid the existence of certain assets, or exaggerated outside claims on the business, in either case so as to achieve an understatement of both annual and accumulated profits. This provided the capability in later years to mask a subsequent deterioration in performance.

The available evidence suggests that most companies used secret reserves during the period in question and that their use had considerable effects on the reported profits of perhaps a quarter of all companies,<sup>39</sup> which means that the published company Annual Reports of the period should not be assumed to be properly reflective of the underlying business realities.

### **3. Vickers Ltd and Sir W.G. Armstrong Whitworth and Co. Ltd<sup>40</sup>**

Vickers had been originally a steel company but in 1888 they decided to lay down plant for the construction of guns and armour and by 1897 their ambitions were beginning to centre on naval armaments.<sup>41</sup> This led to the purchase of the Naval Construction and

<sup>37</sup> J. R. Edwards, *A History of Financial Accounting*, (1989), p.124.

<sup>38</sup> J. R. Edwards and T. Boyns, 'Accounting Practice and Business Finance: some Case Studies from the Iron and Coal Industry 1865-1914', *Journal of Business Finance and Accounting*, Vol.21 (1994) pp.1151-78.

<sup>39</sup> A. J. Arnold, 'Publishing your Private Affairs to the World: Corporate Financial Disclosures in the U K 1900-24', *Accounting, Business and Financial History*, Vol. 7 (1997), p.162.

<sup>40</sup> The two companies were to merge soon after the end of the period under examination.

<sup>41</sup> Scott, *Vickers*, pp.20, 43.

Armaments Company at Barrow, which provided a secure buyer for heavy weaponry produced at their main works in Sheffield.

Armstrongs, originally a general engineering firm, had been making guns for the state from the 1850s and moved into naval armament work in the 1860s, mainly for foreign governments but then as the British government became more 'navalist'. In 1897 they took over the Manchester armourers, Sir Joseph Whitworth and Co. and from then until 1914, 'around 90% of their resources were consistently devoted to the production of armaments for war'.<sup>42</sup>

In the years that led up to the First World War, Armstrongs and Vickers were, therefore, major suppliers of armaments to the state. The great bulk of army supplies continued to come from the Royal Ordnance Factories but the British government believed that the 'first business of the Royal Dockyards was to keep the Fleet in repair' and encouraged the private sector to increase their share of naval warship construction in the years preceding the First World War.

During the war, however, the state looked to the major armaments firms for guns, ammunition and even a large part of the output of shells, as well as naval vessels. Vickers and Armstrongs made particular contributions to the production of machine-guns, 18 - and 60 - pound guns, submarines, airships and aeroplanes and naval ships and weapons.

In the post-war period both companies tried to diversify away from war-related work. Both increased their output of merchant shipping and made major acquisitions, Vickers of the Metropolitan railway carriage and electrical business and Armstrongs of the Siddeley-Deasy motor business and the Newfoundland Paper Mills.

#### **4. Financial Returns According to the Published Data**

Profitability, or rate of return on capital, figures for Vickers and Armstrongs are set out in Table 1. Both companies were financed by means of (quoted) equity, preference shares and debentures and it is therefore appropriate (see above) to calculate profitability both as a

<sup>42</sup> Irving, *New Industries for Old*, p.274.

return on the long-term capital of each company as a whole (ROCE) and as a return to the ultimate risk-takers, the equity shareholders.

Columns (1) to (4) provide these calculations based on the information made available publicly in the Annual Reports of the two companies.<sup>43</sup> During the immediate pre-war period 1910-14, Vickers generated average annual returns on total capital of nearly 10%, two percent above that achieved by Armstrongs. The use of debenture and preference capital, which required returns of 4-5%, meant that returns to equity shareholders could be geared up to average levels of 14% and 11% respectively. These returns would appear to be highly consistent with available benchmark returns.<sup>44</sup>

War conditions 'necessarily restrict(ed) the publication of information'<sup>45</sup> about the operations of both companies and also delayed the presentation of the Annual Reports. The accounts for 1914 and 1915 were not produced until towards the end of the war when it was also found, although settlements had by then been made with the government, that 'the matters dealt with were so complicated and the exact apportionment among the various years was so difficult' that separate accounts could not be prepared for individual years in the period 1916-19; instead the accounts were for the four-year period to 31 December 1919.<sup>46</sup> These were

<sup>43</sup> Two types of adjustment have been made to the profit figures as published. In calculating profits before tax and interest (PBIT), an interest charge has been imputed for loan capital, where this was not stated, using the rate of interest specified for the loans concerned. Secondly, the profit figures allow for transfers to and from reserves that were announced in the Annual Reports, even if these were not shown on the face of the Profit and Loss Account.

<sup>44</sup> The returns on the assets of substantially unlevered companies in the UK iron and steel industry averaged 8.5% over the period 1897-1912; L. E. Davis and R. A. Huttenback, *Mammon and the Pursuit of Empire: the Political Economy of British Imperialism, 1860-1912*, (Cambridge 1986), p.86. The average net profit rate of the entire trading sector for 1913, including any effects of leverage, was estimated at 14.9%; Matthews, Feinstein and Odling-Smee, *British Economic Growth*, p.186.

<sup>45</sup> *Annual Report 1914*, Sir W. G. Armstrong Whitworth and Co. Ltd, Tyne and Wear Archives 130/1329-86

<sup>46</sup> *Annual Report 1919*, Vickers Ltd, Cambridge University Archives V1480. Armstrongs provided very similar explanations in their Annual Report for the same year. Legal advisers believed that the statutory requirement to report annually to shareholders could be satisfied by a report that did not include the current year's accounts!

published in 1920 but the alleged 'restiveness of shareholders' for financial information was not taken too seriously; these accounts, despite the delay and their coverage of a four-year period, were as brief as they possibly could have been.<sup>47</sup>

The published returns for the war years were almost identical to those of the preceding period 1910-14 in the case of Armstrongs and 1-2% lower for Vickers, which had enjoyed slightly better profits during the immediate pre-war period. Both firms were thus earning 8-9% on all long-term capital, geared up by means of cheap fixed-interest capital to provide after-tax returns on equity shares of 10-12%. These returns are very consistent with the dividends paid out by both firms and with Scott's view that 'if the shareholders (in Vickers) had done well out of the war, they had not done extravagantly well'.<sup>48</sup>

Moreover, from 1920 the shareholders appeared to do very poorly indeed. Vickers returns on capital were negligible, resulting in negative returns to equity; Armstrongs published returns of 4% on capital which meant returns to equity shareholders of less than 3%.

## **5. According to Internal Head Office Records**

These conclusions are not necessarily reliable, however, given the nature of contemporary accounting practices (see above). In more recent times both companies have deposited substantial amounts of material in publicly-accessible archives,<sup>49</sup> including financial records,

<sup>47</sup> Armstrong's Profit and Loss Account consisted of four items, the balance brought forward from 1915, the net profit for the four-year period, a special depreciation provision and total dividends; Tyne and Wear Archives 130/1329-86. Vickers trading results for 1916-19 were encapsulated in two lines; Cambridge University Archives V1480.

<sup>48</sup> Scott, *Vickers*, p.133.

<sup>49</sup> Cambridge University Archives, The Library, West Road, Cambridge  
Archival collection of papers on Vickers Ltd:

V1480 *Annual Reports 1910-24* V1481 Documents circulated to shareholders 1910-24 V1503-35 Internal accounts and schedules 1909-1924

Tyne and Wear Archives, Blandford House, Blandford Square, Newcastle-upon-Tyne

Archival collection of papers on Sir W. G. Armstrong Whitworth and Co. Ltd:

130/1329-86 Annual Reports 1910-24

130/269-70 Private Journals 1910-24

130/273-4 Private Ledgers 1910-24

which enable these calculations to be replicated, based upon internal data. These are set out in Table 1, columns (5) to (8).

There were differences between the published and the internal accounts of both companies. Vickers maintained a reserve in their head-office books which was not disclosed in their published accounts at any time during the period under examination although, until 1919, the amounts involved were too small to affect rate of return calculations.<sup>50</sup> At the end of the four-year period to 1919, published after-tax profits were deflated by £1,190,000, by establishing a reserve against debtors of £790,000, an amount out of all proportion to any possible bad debts<sup>51</sup> and a contingency reserve of £400,000 which was included in creditors. These amounts reduced returns to equity by less than 1% per annum, however, across the war period. Equally, although there was a modest write-back in 1920 to supplement reported profits in that year, this practice was not repeated so that the differences between reported and internal profitability up to 1924 were slight.

A more important effect was the non-disclosure of taxation. If the effects of this during the war could to some extent be estimated by the markets the effects during the post-war period were far less predictable; the company's ability to report profits after tax for 1920-22 totalling £2.1M was wholly dependent upon receiving rebates or refunds equal to almost the entire £4M of Excess Profits Duty and Munitions Levy paid during the war. The published accounts thus disguised the extent of the decline in trade after the war and in this important respect the information contained in the internal records does not support Scott's view that 'Vickers had never concealed their difficulties...from their shareholders'.<sup>52</sup>

Armstrongs operated three long-term internal reserves relating

<sup>50</sup> The reserve had been established as a reduction of the cost of investments made in other companies. Only in 1913 did the internal and published profit figures differ by (slightly) more than 1%. The effects upon calculations of profitability were ever smaller; Cambridge University Archives V1503-35.

<sup>51</sup> Sundry debtors were £1,220,000; Cambridge University Archives V1519.

<sup>52</sup> Scott, *Vickers*, p.155. Vickers also ceased to charge depreciation from 1920, when profits were under severe pressure; Cambridge University Archives V1522-35.

to depreciation, Income Tax and trade contracts, which dated back to the pre-war period. In each case the reserve was represented by the excessive generosity of the provisions that had to be made, against declines in the value of the company investments, for the liability to Income Tax during the period 1908-14 and against potential losses on trade contracts. There were also two short-term secret reserves; £500,000 set aside for contingencies in 1918 and reversed the following year and £220,000 set aside for stock losses in 1920. Armstrongs also charged 'special depreciation' and 'special provisions for plant renewal' in its internal records from 1915 to 1919.<sup>53</sup> In part these amounts reflected the additional demands on fixed assets due to war work but they also represented a substantial de facto reserve; in 1921 the asset accounts were reorganised, bringing together payments of £2,800,000 by the Ministry of Munitions and the Admiralty for the additional costs of plant and equipment, with part of the depreciation fund and giving rise to a depreciation surplus of £2,365,000. The most surprising aspect of Armstrong's internal accounts, however, concerned taxation; no indications were found that the company, despite the increased profit levels of the war years, had been liable for Excess Profits Duty or the Munitions Levy (although they did pay Income Tax), presumably because of the level of allowances by the state against special war expenditures.<sup>54</sup>

Over the period 1910-24 as a whole, Armstrongs slightly under-reported returns to equity holders which, according to their head office records were 9% rather than 8%, although practice differed in the three periods, pre-during and post-war. In the period 1910-14

<sup>53</sup> In 1919 the special provision of £1,000,000 was added to creditors, confirming that the company saw the writing-down of capital expenditure as something distinct from, and additional to the more normal depreciation procedures; Cambridge University Archives V1519.

<sup>54</sup> This had however been hinted at in the published accounts for 1915, when it 'had not yet been settled with the Government departments concerned whether the company (was) liable for Excess Profits Duty or the Munitions Levy in respect of the year 1915, (and) the Directors did not consider it necessary to make any special provision on this account'; Directors Report 1915, Annual Report dated 18 November 1916, Tyne and Wear Archives 130/1329-86.

the internal profits were lower (averaging 9.2% rather than 10.7%) and less regular than those published. During the years 1915-19, Armstrongs did maintain internal, annual Profit and Loss Accounts, despite their public stance that the 'extent and complexity of the work undertaken during the war' had made it impossible to separate the accounts for the individual years concerned<sup>55</sup> and they indicate that the 'real' returns to equity holders were just over 15%, as against the 10.4% shown in the published accounts, and that 1916 (26%) and 1917 (15%) had been the most profitable years. In the post-war period, 1920 was also far more lucrative than announced but thereafter the returns to ordinary shareholders were (slightly) negative, rather than modestly (circa 2%) positive, as shown in the published Annual Reports.

## **6. Based on the Performance of Vickers Shipyard Division at Barrow**

The internal records for Vickers were incomplete across the war years in two respects. Vickers was organised on a divisionalised basis, whereby the geographically distinct parts of the organisation maintained their own routine accounting records and sent formal yearly accounts to head office. The records held at Cambridge University include internal accounts and schedules for the company as a whole and for (some) individual parts of the organisation. Although there are some internal accounting records from 1909, these do not constitute a complete set until 1919. Moreover, the published and the internal (head office) accounts for Vickers for 1916-1919 were not separated into individual years.

The naval yards at Barrow-in-Furness, acquired in 1897, was one of the most important parts of the Vickers organisation, constituting an in-house customer for the large weapons produced in the main works at Sheffield and enabling the company to become one of the main suppliers of naval hardware to the British government.

<sup>55</sup> *Annual Report for 1919*. Sir W. G. Armstrong Whitworth and Co. Ltd, Tyne and Wear Archives 130/1329-86.

The yards at Barrow kept separate accounts that provided considerable detail concerning the costs and revenues of particular contracts and groups of contracts and, in summarised form, also provided information to, and thus facilitated control by, head office. The connections between the two sets of books were simple, explicit and subject to careful reconciliation; thus, for example, the annual net profit figure 'leaving' Barrow matches the contribution 'received' into head office. A set of these records have been retained by Vickers Shipbuilding and Engineering Ltd at their shipbuilding works at Barrow-in-Furness<sup>56</sup> covering each year in the period under examination, including 1916-19, and they therefore provide the opportunity both to compensate to some extent for the incompleteness of the Vickers head-office records and to extend the analysis of the profitability of war-time armaments work.

The capital investment in Barrow was provided by head office and consisted of the initial purchase consideration, augmented by subsequent (net) cash transfers and the annual profits made by the division. The capital account thus functioned as an active current account and was not subdivided into permanent (shares) and temporary (reserves) sections, although some free reserves were established. The structure of the Profit and Loss Account was fairly straightforward; no dividend payments were made by Barrow but interest charges were paid in some years to head office, as a contribution towards the debenture interest expenses of the company as a whole.

Returns on the capital invested in the Naval Construction Works can be calculated on a basis consistent with that used for Armstrongs and Vickers, after making a number of adjustments to the accounts. Firstly, the capital inputs from head office can be seen as equivalent to the total capital of the company i.e. to a combination of equity, preference and debenture finance, since this was the basis on which the company as a whole was funded. Given

<sup>56</sup> Company Archives, Vickers Shipbuilding and Engineering Ltd, Barrow. Shipbuilding Works, Barrow-in-Furness, Cumbria: Items 16-31, Balance Sheets and Profit and Loss Accounts and Schedules thereto, 1910-24

**Table 1: Rates of Return at Vickers and Armstrong-Whitworth, 1910-24**

	Published Data				Internal Data			Barrow	
	Vickers (1) ROCE (%)	(2) ROE (%)	Armstrongs (3) ROCE (%)	(4) ROE (%)	Vickers (5) ROCE (%)	(6) ROE (%)	Armstrongs (7) ROCE (%)		(8) ROE (%)
1910	7.75	11.53	7.15	9.38	7.03	10.53	5.51	5.80	24.94
1911	8.97	13.82	7.04	8.74	7.92	12.75	7.03	8.01	25.00
1912	11.23	17.58	8.74	11.39	9.83	16.24	9.71	12.43	21.04
1913	12.10	17.28	8.30	11.95	10.84	16.23	6.45	8.01	7.07
1914	9.40	11.94	8.80	11.88	8.56	11.21	9.26	11.94	16.19
1915	9.90	12.41	10.39	12.20	8.81	11.76	12.25	13.77	34.49
1916							22.40	25.97	25.80
1917							15.64	15.43	27.65
1918							11.55	9.68	9.76
1919							11.12	11.62	45.77
1916-19	8.80	12.21	7.19	9.94	12.55	11.48			
1920	2.62	1.51	4.87	4.94	-3.19	0.87	9.17	11.75	-30.95
1921	2.64	1.55	3.90	2.33	1.00	1.68	1.84	-1.95	-7.09
1922	2.55	1.43	4.03	2.59	1.48	1.68	2.67	0.18	27.32
1923	-3.90	-9.19	3.85	2.22	-3.30	-8.20	3.21	1.34	-3.09
1924	-1.98	-6.52	3.78	2.39	-1.70	-6.38	2.08	-0.94	-6.84
Averages									
1910-14	9.89	14.43	8.01	10.67	8.84	13.39	7.59	9.24	18.85
1915-19	9.02	12.25	7.83	10.39	11.80	11.54	14.59	15.29	28.69
1920-24	0.39	-2.24	4.09	2.89	-1.14	-2.07	3.79	2.08	-4.13
1910-24	6.43	8.15	6.64	7.98	6.5	7.62	8.66	8.87	14.47

Notes:

ROCE = Profit before interest and tax (PBIT)/Capital Employed  
(Equity, Preferences and Debt)

ROE = Profit after tax (PAT)/Equity Shareholders Interest

Sources:

Calculations based upon archival papers as follows:

Columns 1, 2, 5, 6: Cambridge University Archives, Vickers Ltd  
V1480-81, V1503-35Columns 3, 4, 7, 8: Tyne and Wear Archives, Armstrongs  
130/269-70, 273-4, 1329-86Columns 9: Vickers Shipbuilding and Engineering,  
Barrow-in-Furness, item 16-31

this perspective, interest payments to head office have been added back to profits, to avoid an effective double-charge. Similarly, when Income Tax was charged in arriving at the net profit figure, it has also been added back.

Secondly, it is apparent that the profit figures for the Barrow yards shown in their head-office books were deflated during the war years by special depreciation charges and write-offs and by the creation of local secret reserves and enhanced subsequently by zero depreciation charges, by the writing-back of capital items charged during the war and by the reduction of secret reserves. Movements on inner reserves and capital write-offs and write-backs were

reversed and depreciation charges placed on a consistent basis which recognised the heavier usage of assets during the war years and the sudden fall in the utility of assets during the slump of 1920-21.

These adjustments meant that a profit figure could be computed, before interest, tax and dividends (PBIT), as the basis for identifying returns on capital employed consistent with the view of capital invested at Barrow as equivalent to equity, preference and debenture capital.<sup>57</sup> These are shown in Table 1, column (9) and are returns on capital invested at Barrow, which do not take into account any leverage effects that would benefit equity shareholders during years in which returns exceeded the cost of fixed-return capital. The periods 1915-19 and 1920-24 were, respectively, the most and the least profitable since Vickers took over the Barrow yards. Average returns for 1915-19 of nearly 29% can be compared with 15% for the period 1897-1914,<sup>58</sup> or just under 19% for the period 1910-14 while the negative returns of 1920-24 were the first loss-making years since the completion of the initial phase of investment in 1901.

The archival material at Barrow also means that these returns can be subdivided into their secondary effects, the amount of business or turnover generated relative to the capital in use, and the profit margin, the profitability of each given amount of turnover, both of which can be further analysed by main category of contract work. This is important because any increase in overall contract margins, for example, could be due to rising profitability levels, or to the substitution of higher-profit for lower-profit work. The analysis of returns on capital employed at the Barrow works of Vickers has been set out in Table 2.

The first column identifies the level of turnover relative to the capital employed and indicates that the higher returns at Barrow during the period 1915-19 as compared with 1910-14 were partly caused by more intensive use of capital (turnover was 2.44 times

<sup>57</sup> The effects of the adjustments to profit on the size of capital employed was taken into account before calculating returns on capital employed.

<sup>58</sup> Arnold, *Commercial Returns*, p.30.

the size of capital employed as against 2.13 times in 1910-14) and partly by higher net returns (11.76% as against 8.85%). The latter is affected by general business expenses but in large part reflects variations in the levels and profitability of particular categories of contract work, details of which are set out in columns (2) to (9). During the war years, munitions and submarine work substantially displaced the construction and arming of major ships at Barrow and provided levels of gross profit of 13-14%, which were distinctly but not spectacularly higher than the profitability both of these categories of work before the war and of contracts for the construction and arming of ships during the war.<sup>59</sup>

In 1919, the senior management were confident that the immediate post-war boom would continue and believed that they were 'practically assured of work for ten years at Barrow, at a profit of not less than say 10%'<sup>60</sup> but this was before the severe slump of 1920-21; by the spring of 1922, times were the hardest in living memory. Levels of business across 1920-24 were only half their pre-war level, while margins on the main category of work, ship construction, collapsed to less than 2%, with consequent effects upon overall profitability.

## 7. Conclusions

This paper has provided an analysis of the profitability of the two major British armaments companies, Vickers Ltd and Sir W G Armstrong Whitworth and Co. Ltd across the trans-war period, 1914-24 in order to provide new evidence on the benefits of war to firms centrally involved in the war economy and on the nature

<sup>59</sup> War work was highly profitable to the major shipbuilding firms on the Clyde, where contributions (i.e. profits before fixed costs) averaged 23% of contract price across the period 1915-23, consistent with the period 1894-1908 but well above those of the immediate pre-war years, which averaged 13.6% of invoice price; H. B. Peebles, *Warshipbuilding on the Clyde*, (Edinburgh, 1987) p.91, p.158. Profits on Admiralty work at one Clyde yard, Fairfields, averaged 12.8% of contract price across the period 1920-29; R H Campbell, *The Rise and Fall of Scottish Industry 1707-1939*, (Edinburgh, 1980), p.138.

<sup>60</sup> Scott, *Vickers*, p.138

of interactions between the state and the business sector during this period.

During this period, the central importance of armaments firms to the war effort meant that they continued to enjoy a special relationship with the state, although one which took a rather different form to that which was obtained in the twenty years preceding the First World War.

The state can utilise wide-ranging powers of compulsion particularly during war, which increases its legitimacy. Even theoretically absolutist or 'despotic' governmental powers are, however, restrained in reality by the private ownership of the means of production so that the critical elements in the attempts of the British state to achieve its objectives during the First World War were probably the use of what Mann has described as its 'infra-structural' powers from 1915, through the process of institutionalised negotiation.

The armaments firms, notably Vickers and Armstrong Whitworth, were particularly important to the negotiations between the state and the major interest groups in the British economy and were central to the business sector's involvement in the new 'total war economy'. Private-sector armaments firms have often, particularly during peace-time, been censured for their activities and the 1935-36 Royal Commission on the Manufacture of and Trade in Armaments recommended a number of restrictions on their autonomy including the use of 'strict costing methods to eliminate profiteering'.<sup>61</sup> There are clear benefits to the state in reducing the costs of the armaments which it requires and indisputable examples of unusually high profits on individual contracts but there has been very little discussion or analysis, based upon reasonably reliable evidence, of the extent to which the armaments companies were able to earn unusually high returns.

It is important, as with all economic data, to avoid the use of information which is inherently biased. Noel-Baker, for example,

<sup>61</sup> Anderson, *British Rearmament*, p.28.

criticised the increase in Vicker's profits in 1913 as being 'nearly three times what they had been in 1908', although had increases in the amount of capital utilised been recognised, the resulting growth in profitability would have been halved.<sup>62</sup> Moreover, deriving conclusions about company profits from published data is far from ideal, since the reporting companies have an ability to influence the signals provided. There can be little confidence that the published profits of firms in an industry as politically sensitive as armaments during the First World War will be reliable, although the evidence we have of the financial accounting practices of the time suggests that the deviation from 'reality', or degree of 'profit-smoothing', may well be a partial function of the level of underlying profitability.

The published accounts of Vickers and Armstrongs were very limited in their content and indicated similar returns during the war years to those of the (relatively prosperous) period 1910-14; returns on long-term capital of 8-9%, levered upwards through the use of fixed-return capital to a return of 10-12% to equity holders. The information contained in the main archives of the two companies indicated the use of secret reserve accounting and a number of other accounting practices which deflated the returns of the war years, and increased those of the post-war period. In the case of Vickers the distortion during the war years appeared to have reduced the returns to equity interests by only 1% but at Armstrongs it implied returns to equity of over 15%, as compared with the 10.4% published, with 1916 (26%) and 1917 (15%) being the most profitable years.

Internal records do contain 'new' information although it is hard to be sure that there are not still more covert versions of 'reality'. Some indication of this is provided by later periods of time; when company fortunes are at their lowest, for example, it is highly likely that secret reserves, however clandestine, will be utilised. The information contained in the main Vickers archive was far from complete and this casts some doubt on the reliability of the internal information set. One of the more important parts of the Vickers

<sup>62</sup> Noel-Baker, *The Private Manufacture*, p.506.

**Table 2: Profit Margins by Main Contract Category,  
Barrow Naval Works, 1910-24**

	Capital	Ship & Hulls		Submarines		Gun Mounting		Munitions	
	(1) T/o (times)	(2) GM (%)	(3) T/o (%)	(4) GM (%)	(5) T/o (%)	(6) GM (%)	(7) T/o (%)	(8) GM (%)	(9) T/o (%)
1910	1.79	16.90	62	5.80	7	31.50	24	14.50	2
1911	1.91	7.30	42	13.20	11	28.10	39	13.80	2
1912	1.88	7.10	43	18.00	8	24.20	35	7.00	1
1913	2.23	2.20	62	7.80	8	3.40	20	-4.90	2
1914	2.82	1.60	46	10.30	10	12.60	28	17.20	2
1915	2.01	7.50	19	21.10	21	12.60	14	23.90	40
1916	2.65	11.70	14	11.80	10	7.10	5	13.10	63
1917	2.38	15.20	28	17.70	7			5.10	51
1918	1.43	0.00	10	5.00	39	12.00	2	12.40	35
1919	3.74	14.80	13	10.90	8	14.90	8	12.90	53
1920	1.04	-17.20	16	7.40	39				
1921	1.73	-4.60	64	10.90	3				
1922	1.77	2.70	81						
1923	0.35	27.00	35			46.00	5	45.20	11
1924	0.89	1.40	60			21.60	7	36.70	10
<b>Averages</b>									
1910-14	2.13	7.02	51	11.02	9	19.96	29	9.52	2
1915-19	2.44	9.84	17	13.30	17	11.65	6	13.48	48
1920-24	1.16	1.86	51	9.15	8	33.80	2	40.95	4
1910-24	1.91	6.24	40	11.66	11	19.45	12	16.41	18

**Notes:**

T/o = Turnover

GM = Gross profit margin on contracts ie before the inclusion of joint costs

**Sources:**

Calculations based upon archival collection of papers held by  
Vickers Shipbuilding and Engineering, Barrow-in-Furness, items 16-31

organisation was the naval division at Barrow-in-Furness and the availability there of a very complete set of internal records provided the opportunity to both supplement and extend the analysis of the main company. In particular, the rate of return on the capital employed in the naval yards rose from just under 19% for the period 1910-14 to nearly 29% for 1915-19. These rates are not entirely reliable in absolute terms, as they do not include the full cost of the company's head office operations, but in relative terms they are highly supportive of the levels of increased profitability shown in the central internal records of Armstrongs for the war years. It is also noteworthy that the increased returns of the division at Barrow came from the more intense use of capital and from the diversion of activities into particular types of war-related work as well as from higher contract profits, and that the increase in the

<sup>63</sup> Anderson, *British Rearmament*, p.7.

latter was moderate rather than spectacular. Thus, in many ways, this analysis provides a further contribution to what Anderson has described as Trebilcock's representation of 'the rather unsensational reality behind the "legends" of the arms firms',<sup>63</sup> although one focused upon the years of and immediately following, rather than preceding, the First World War.

The dominating armaments firms were able to increase their rates of return on capital through their contribution to the war effort, perhaps by half in relative terms, net of the surprisingly small net charges for Income Tax, Excess Profits Duty and Munitions Levy, although before taking into account the effects of the other great war tax, inflation.

If the effects of inflation on the profitability of Armstrong's are recognised on a very limited basis, treating the decline in the purchasing power of the nominal value of equity shares only as a charge against profits, then the return on equity interests would be lower in the period 1915-19 (6.96%) than in 1910-14 (8.51%).<sup>64</sup> There are alternative, and generally more extreme, ways of conceptualising the effects of inflation on profitability but it is clear that a large part of the increased profits of the war years were an early, and poorly acknowledged, example of money illusion.<sup>65</sup>

The profits made on some contracts with the state for the supply of arms undoubtedly provided excess profits but, at a more aggregate

<sup>64</sup> Using the series for Gross Domestic Product at factor cost; C. H. Feinstein, *National Income, Expenditure and Output of the United Kingdom, 1855-1965*, (Cambridge, 1972), T132. The calculations have been applied to Armstrongs because internal data was available for the company as a whole for each year in the period 1910-24, and because the evidence provided by the Barrow data was generally consistent with the Armstrong's internal profitability series. The corresponding average returns on equity interests for 1920-24 were 3.73%.

<sup>65</sup> The problem of inflation was not, of course, confined to the incomes of the owners of capital; see Waites, *A Class Society*, particularly pp.130-47.

<sup>66</sup> The Select Committee on National Expenditure and the Ministry of Munitions in 1917 stated that, for firms contracting with the Ministry of Munitions, 'in general and very generally stated, the maximum profit aimed at was 10% of the cost of wages, materials and expenses'. In reality these criteria were applied more flexibly according to the level of risk involved; S. Marriner, 'The Ministry of Munitions 1915-1919 and Government Accounting Procedures', *Accounting and Business Research*, Vol. 10 (1980) p.137.

level, the contracts placed at Barrow provided profits which may have been somewhat more generous than the general criteria used by the Ministry of Munitions but, if so, not by an extravagant margin.<sup>66</sup>

The armaments industry is inherently cyclical and rates of return are likely to show quite considerable variation over time, according to changes in the state's political/strategic position and there are consequent dangers in over-generalising the rates of return earned in any one period. Moreover, although rates of return are valuable and highly tangible indicators of the nature of the working relationship between the state and firms in the private sector, there are grounds for believing that the real benefit from war work may be imperfectly signalled by these monetary relationships.

Instead, a substantial part of the benefit from war work must have been represented by the fixed assets financed by the Ministry of Munitions or the Admiralty and the generosity of allowances provided after 1920, often in the form of rebates, and offset against fixed asset balances as compensation for the intensive use of other plant and machinery.<sup>67</sup> This certainly applied to the major armaments firms; Armstrongs merged a receipt from the government with their depreciation fund in 1921 and was able to recognise a large surplus in 1923 (see above) while Vickers received substantial rebates after the war, at the end of complex negotiations.

The accounting policies applied to fixed assets by both firms in the immediate post-war period represented highly conservative valuations of the asset base, as the companies looked forward to using their enlarged capacity in a buoyant post-war economy. The enormously increased plant built up during the war years represented a very real manifestation of the pleasure felt by the

<sup>67</sup> The generosity of the settlements may not have been entirely accidental. Colonel Wright of Armstrongs, for example, was 'caught helping the steel interests to get better terms from the Ministry ... coaching up the steel makers to demand high terms in connection with the taxation of profits, so as to induce us to allow large reductions in connection with the putting up of extensions ... [and] ... apparently egging on the steel makers to demand at least an allowance of 75% on the cost of these extensions: C. Wrigley, 'The Ministry of Munitions: an Innovatory Department' in K. Burk (ed.), *War and the State: the Transformation of British Government 1914-19*, (1982), p.42.

directors of Vickers who, in September 1918, acknowledged the repeated compliments they had received from members of the government at the 'services which the company had rendered' the state during the war. If financial accounting practices had any major, distorting role it was more in hiding the severity of the post-war slump than in masking the benefits of war work itself and, when the sudden slump of 1920 rapidly emptied the enlarged facilities of the armaments firms, the commercial benefits of wartime expansion and state support were to seem very different.