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Illuminating the darkness: the impact of the First World War on cost calculation practices[1] in British firms

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Abstract

Through a detailed examination, using business archives, of the impact of the First World War on cost calculation practices in British firms, this paper examines, and finds wanting, the claim of Loft (1986, 1990) that cost accounting came into the light in Britain during the First World War.

Keywords: *costing, Britain, First World War*

1. Introduction

1.1 Loft's view

In a seminal, and oft-quoted, article published nearly twenty years ago, Loft famously declared that, during the First World War, "cost accounting, as a contemporary observer put it, 'came into the light'" (1986: 141). In the conclusion to her paper, Loft claimed that "The bringing of cost accountants and cost accounting 'into the light' came as a virtually unanticipated consequence of the war-time legislation passed with the intention of helping to prevent profiteering and to provide a basis for setting the prices of contracts for items for which there was no clearly identifiable market" (1986: 165). This fundamental appraisal of First World War developments was enshrined by Loft in the title of her book examining the early development of the Institute of Cost and Works Accountants (ICWA) between 1919 and c.1930: *Coming into the Light* (1990). In these two works, Loft explored the genealogy of the early development of the cost accountancy profession and showed how this was closely tied

[1] The term cost calculation practices is used here in an attempt to avoid any complications that might arise from using the plethora of different terms which were in use during the time period examined and which may have specific connotations, in particular costing, cost systems and cost accounting. It is also intended to imply that the focus of the paper is on the cost figures that firms calculated and, where possible, the methods they used to calculate such costs.

up with the social and political forces which existed between 1914 and 1925. As part of this process, Loft discussed the rise of scientific costing and referred to the development, or rather lack thereof in Britain, of 'sophisticated' costing systems (1986: 141).

The phrase 'coming into the light' was adapted by Loft from a sentence in an address given by Herbert G. Jenkins, FCWA, MIEE, finance director of Hans Renold Ltd., when seconding the vote of thanks to Lord Leverhulme, the president of the ICWA, for his address to a public meeting held under the auspices of the Manchester and District branch of the ICWA at the Memorial Hall, Albert Square, Manchester on 2 November 1922:

> One cannot do this [reflect the great debt owed by the ICWA] without referring to the very great service which Lord Leverhulme has rendered to the Institute and the cause of the Works Accountant ever since the profession of cost accountancy came into the light.

(*The Cost Accountant*, December 1922: 216-7)

It is far from clear to this author that Jenkins' comment can be taken to imply that the war had any major impact on cost calculation practice, as implied by Loft in her works, other than merely making more visible what was already being done. Nevertheless, it is clear that he attributed the 'coming into the light' of cost accountants and the profession of cost accountancy to the war, for in his next line he states: "As I think the Lord mayor himself told us the Cost Accountant has existed for a very large number of years but it was only as a result of the war that he came to be a recognised member of the business community" (*The Cost Accountant*, December, 1922: 217).

In attempting to make her case for the impact of the First World War on cost accounting, Loft (1986, 1990) judiciously employs contemporary quotes implying that, on the one hand, cost accounting was backward prior to the war and, on the other hand, that there was more, and improved, cost accounting taking place after the war. While recognising the existence of some cost accounting before 1914, and that the costing systems put forward by the government during the war were not perfect and suffered problems and failures, Loft nevertheless claims that cost accounting was given a major boost by the war and post-war reconstruction plans, so that cost accounting can be seen as ‘coming into the light’ during the period 1914-1925. In particular, there is a strong implication that cost accounting became more sophisticated. While accepting that some businesses had developed quite complex cost accounting systems in the late eighteenth century, Loft suggests that cost accounting in Britain began to spread only during the late nineteenth century, especially as the result of the Great Depression of 1873-96 (1990: 1 and 7). Noting that “management accounting history is open to many interpretations because of the paucity of surviving records” (Loft, 1990: 8), Loft points out that how detailed cost systems were, and how widely they were used is a matter of debate (1990: 1), though she does accept that, prior to the First World War, some firms had installed cost accounting systems with the aid and advice of chartered accountants (1990: 11). In the engineering sector, Loft notes the relevance of costing systems for determining prices where contract work was the norm (1990: 8). Overall, however, Loft argues that the development of cost accounting systems in Britain was backward when compared to America. Thus, while Britain may initially have been in the forefront of such developments, by the First World War she trailed America by a significant margin (Loft, 1990: 8-9), not least because pre-war conditions in Britain were not favourable to the "widespread emergence of

sophisticated costing systems" (Loft, 1986: 142). Loft goes on to point out that "The involvement of Government in business life during the First World War revealed that the development of cost accounting systems in British industry was very uneven" (1986: 141).

The war, however, provided a significant boost: the emphasis of government contracting during the war on cost-plus contracts, increased manufacturers' concerns with costs; there was a more widespread discussion of cost accounting; and clerks and accountants working in industry became more visible (Loft, 1990: 20). The major developments which brought about these consequences stemmed directly from the establishment of the Ministry of Munitions in 1915. This led to many existing businesses becoming controlled establishments, i.e. remaining under private ownership but being subjected to direct government control of production, etc., and also to the building of National Factories, e.g. for shells and chemicals. In early 1916 new regulations governing the prices which the government would pay for supplies came into effect, with costs being determined in one of three ways: technical costing (estimates made by engineering experts); accountancy costing (actual costs as determined by contractor's books); and using as a basis the cost returns from the National Factories where similar articles were being produced (for further details see Loft, 1990: 14-15; Marriner, 1980: 460-3). Loft particularly emphasises developments in the National Factories, suggesting that in them "cost accounting systems were quite advanced in nature" (1990: 20). Quoting from the unpublished history of the Ministry of Munitions, Loft claims that in the National Shell factories the system of cost accounts devised was 'sophisticated' (Loft, 1990: 15), enabling the determination, for each process of shell manufacture, of:

> a statement of the output, its cost in material, wages and establishment charges, and the extent to which each of these items was affected by faulty materials or defective workmanship.

Loft, however, does recognise that the systems introduced by the government were not perfect and that there were many problems and failures (1990: 16). Nevertheless, Loft claims that, "Despite the problems cost accounting apparently became a better known and more widely practised technique during the war period" (1990: 16). Indeed, she has argued that "Manufacturers had costing forceably brought to their attention through government measures and, as a result, the institution of cost accounting systems in manufacturing seems to have proceeded quickly" (Loft, 1986: 141). Furthermore, Loft claims that the era of 'reconstruction', with its emphasis on efficiency, which immediately followed the war, added further impetus to the development of cost accounting systems, not least through the recognition that uniform costing systems could be beneficial in this process (1990: 2).

1.2 The views of other writers

Despite Solomons' "costing renaissance" of the late nineteenth century (Solomons, 1952), and the comment of Edwards (1937: 344) that, by 1906, "practically all the problems which are discussed in modern [costing] works had been dealt with", it is conventionally believed that, during the first half of the twentieth century, Britain was, in some senses, backward in terms of the nature and extent of its usage of cost calculation methods, especially when compared with the USA. Indeed, for many writers on the development of management accounting in Britain, the story really begins after the Second World War. Thus, surveying the changing

nature of management accounting in Britain, Ashton *et al* (1995: 2) have argued that "Despite the pioneering work of British engineers and accountants in devising cost accounting systems at the turn of the century, the application of such systems had been slow in Britain [prior to the Second World War]". The reason for this assessment would appear to be that those developments which preceded the Second World War did not constitute management accounting. Indeed, one of the authors just quoted has argued that "Before the Second World War the primary focus of internal accounting was on determination of costs, with particular emphasis on product costing and the control of direct labour, direct materials and overheads" (Scapens, 1991: 8).

Focusing particularly on the First World War and its impact, Fleischman initially seems to have accepted Loft's argument that the impact was significant: "World War I had a pronounced effect on cost accounting in the UK where theory had apparently been running ahead of practice since the Industrial Revolution" (1996: 132). However, in a more recent, jointly authored, piece, Fleischman has suggested that Loft's assessment of the impact of the First World War may have been exaggerated, accusing Loft of responding "favourably to what might have been MM [Ministry of Munitions] puffery in inspiring the nation to a more broadly based costing awareness" (Fleischman and Tyson, 2000: 197). A major reason for this re-assessment seems to have been the arguments advanced by Marriner (1980) who, like Loft, based her work largely on government records, in particular, an unpublished history of the Ministry of Munitions. Contrary to the view of Loft, Marriner suggests that the impact of government control through the Ministry of Munitions was limited, not least because the Ministry's systems had major inherent failings. Since they used basically the same evidence, and came to starkly different conclusions, Fleischman and Tyson conclude that this must "leave the quality and permanence of these innovations seriously in question" (2000: 198). Despite criticising Loft's analysis, Fleischman and Tyson (2000: 195) nevertheless continue to put forward the view that costing theory was ahead of costing practice in the period before the First World War: "Both Locke (1979b: 6) and Loft (1986b: 107) cautioned that the 'renaissance' as measured by journal articles and books did not connote advances in [British] practice".

In the light of the debate over the impact of the First World War, this paper seeks to address the issue of whether or not it had a major impact on cost calculation practices in British firms. It will do this through both a re-examination of the contemporary accounting literature and an examination of the evidence contained in the archives of a number of firms in important sectors of the economy, namely, coal, iron and steel, chemicals and engineering. Since all of the firms that are examined in the study carried out some method of cost calculation prior to the outbreak of the First World War, this study cannot draw any conclusions as to the extent to which the use of cost calculation practices became more widespread, but it can address the issue of whether firms changed their systems as a result of the war. Furthermore, the study will throw some additional light on the state of cost calculation practices in Britain prior to the First World War and the issue of whether practice was running behind theory or not.

2. Cost calculation practices in Britain, c.1880 - c.1925

2.1 Pre-First World War developments

2.1.1. The views of contemporaries

Reviewing the evolution of cost accountancy in 1919, J.M. Fells argued that "There has been some form of it from the beginning of time" (1919: 548). Attempts to find their costs of production can be found amongst those engaged in cottage and domestic industry from the early days, while the introduction of electricity and steam, and the use of machines, "has led to the very careful and systematic allocation of the various items making up the cost of any product" (Fells, 1919: 548). In Fells' view, the costing "function has preceded the structure of any cost accountancy systems" (1919: 548), and subsequently went on to remark that "The need for costing has always been recognised, and there have been many systems practised" (1919: 550). He did, however, indicate that not all manufacturers had the wisdom to understand the importance of knowing his cost.

Others were equally of the view that the origins of costing were to be found long before the FWW. Massey echoed the view of Fells, suggesting that the fundamental principles of costing have been used in some form or other since the commencement of trading, though he noted that "of late years it [costing] has developed more on the lines of an exact science, certain broad principles having come to be recognised as standard and which form a basis on which to build up the individual system" (1919: 12). Other references imply that, by "late years", Massey meant during the "last generation". A similar view to that of Massey was expressed by Annan some years later, when he stated that "Cost Accounts existed in Britain, as elsewhere, long before" the First World War (1930: 183). Todman, while noting that ten years previously cost accountancy was largely unknown to the general public, nevertheless "Cost and Works Accountants had for many years exercised their mysterious functions in obscure corners of great industrial concerns" (1922: 179). According to Thistlethwaite (1928: 149), cost accountancy was thirty to forty years old. It seems clear that commentators in the decade or so following the end of the First World War considered that cost accountancy, using the terminology adopted at the time, had commenced in earnest during the late 1880s or early 1890s, i.e. from around the time that Garcke and Fells first published their work, *Factory Accounts*, though the origins of costing were to be found in the mists of time. But how widespread was the use of cost calculation practices before the First World War and what was the nature of these practices?

According to Plumpton (1892: 268) "no firm of engineers would seek to carry on their business without some description of costs, for it is the backbone of their business". He went on to note that "last year my assistance was required in the formation, designing, and establishing of a thorough system of departmental costs in a large steel works not many miles from here, a firm that employs 1,500 workmen" (Plumpton, 1892: 268). Plumpton also noted that collieries "keep elaborate Cost Accounts of their workings" (1892: 268), and that costs were also kept by builders and in many manufacturing trades. Presenting a paper in early 1901, F.G. Burton, ASAA, while failing to provide any direct indication of the extent to which cost accounts were applied in business, remarked that firms in different industries required different types of cost accounts, and noted that it was "in the more complex trades, such as large chemical manufactories and mechanical or civil engineering works, that we shall

find the greatest use for Cost Accounts, and seek for guidance in constructing them" (1901: 115). The leader comment writers of *The Incorporated Accountants' Journal*, however, were more forthright, noting that "The keeping of proper cost accounts ….. is generally looked upon by the manufacturer himself more as a luxury than a necessity, and only in a very few industries has it come to be a recognised element in the counting-house system" (March 1901: 101). Later the same year, A.E. Showell, chief accountant of the Salt Union Ltd. stressed the importance of cost accounts in helping businesses throughout the country to face up to the "re-doubled efforts of foreign countries to capture our trade" (1901: 59). In the discussion that followed the presentation of Showell's paper, W. Strachan, FSAA, referring to British manufacturers, commented that "They usually have their own methods of costing - mental or otherwise - which are very imperfect; in fact, I should think that in the majority of cases where rough and ready calculations are applied, establishment expenses are left out of account altogether, and as these are often heavy, the results arrived at must necessarily be very inaccurate and misleading" (Showell, 1901: 64). That something positive needed to be done to improve matters in Britain was highlighted by the leader writers of *The Incorporated Accountants' Journal*, who noted with pleasure that the matter of cost accounts was receiving more attention. They particularly noted that "Lately we have been receiving a few object lessons from abroad as to the value of this section of accountancy, and it may be that, in time, our manufacturers throughout the country will come to realise that Cost Accounts are as much a necessity to the intelligent and economical management of a factory, as a proper system of financial accounts are to the efficient conduct of a counting house" (Dec. 1901: 54). It was also commented that Cost Accounts were to be met with more in the great manufacturing centres of the northern counties than in the metropolis. A similar point was made in a leader comment nine years later, when it was pointed out that experience of cost accounts was confined largely to localities where manufacturing is most highly organised (*The Accountant*, Sept. 1910: 395).

In May 1904, *The Incorporated Accountants' Journal*, published a paper on the subject of 'Cost Accounts', originally presented by James Rider before the London Incorporated Accountants' Students. Rider introduced himself as follows: "During the past 17 or 18 years, in the North of England salt and iron and steel industries, and, more recently, in the engineering industry in other centres, I have given special study to the best and most efficient means of compiling Cost Accounts in such a form as to readily supply all information necessary to allow business to be negotiated intelligently and to the greatest advantage" (1904: 178). In commenting upon this paper, the leader writers of the journal noted that cost accounting was "still in the stage of youthful development with few settled principles" ('Cost accounts', *The Incorporated Accountants' Journal*, 1904: 175). A leader comment six years later made a similar point, noting that the "proper or scientific treatment of Cost Accounts is a comparatively new development" (*The Accountant*, Sept. 1910: 395). In a paper presented to a number of student societies in early 1907 on the subject of cost accounts for small manufacturers, Mark Webster Jenkinson, chartered accountant, noted that "at the present day but few (sic.) the manufacturers who have any efficient costing system in operation" (1907: 315-6). Jenkinson went on: "Ask the *small* manufacturer why he does not keep proper Cost Accounts, and he will generally tell you that profits are so small that he cannot afford the expense" (1907: 316). Just before the First World War, Britten (1912: 449) likewise criticised small manufacturers for a lack of willingness to adopt what they saw as expensive systems of costing.

The focus of Jenkinson and Britten on small manufacturers may imply that, in their judgement, this is where the greatest problems lay, not least because most large and medium sized businesses already had cost calculation practices in place. Indeed, Hamilton claimed that "It is a mistake to think that any factory goes on without a costing system. The thing is impossible, though it is far from impossible that the system is a bad one" (1910: 202). According to Hamilton, all manufacturers had some way of arriving at prime cost, and though this may be somewhat crude it did "not depart materially from fact, or would not do so if only they were tightened up so as to provide for possible dishonesty, and, what is far more to be feared, waste through carelessness" (1910: 202). He went on: "Where the unsystematic manufacturer is likely to go wrong in his costing is in this same leakage, but more particularly in estimating the percentage to be added for expenses" (Hamilton, 1910: 202). In contrast, however, Dicksee contended that there was a lack of attention being given to costing at the time of the outbreak of the First World War, a neglect that was reflected in the poor staffing and low status of internal accounting departments (1915: 18-19). This view was echoed many years later by Pulford (1927: 403), who stated that, even as late as 1914, in many industries, costing was carried out in a perfunctory manner. During the war itself, however, Dicksee (1917: 161) did admit that costing was usual amongst firms in the basic industries of coal and iron, but noted that it had only recently been applied by manufacturers. In respect of colliery concerns, Jenkinson made the comment that cost accounts could be highly variable in their quality: "in some cases the Cost Sheets are badly designed, and the results obtained unreliable [but] … in large collieries there are exceedingly good costing systems in operation, and a valuable fund of statistical information is collected and used by the management for control purposes" (1919: 81).

In attempting to sum up the views of contemporaries, as revealed in the accounting literature, while it was accepted that costing had long been carried out in Britain, there is evidence that, before the First World War, its use was limited to certain major sectors of the economy, e.g. coal, iron and steel, chemicals and engineering, where large and medium sized firms were more likely to have adopted cost calculation practices than small firms, and not all systems were likely to be efficient or scientific, whatever these latter terms might mean.

2.1.2 Evidence from the archives

During the last ten to fifteen years, an increasing amount of research has been carried out into the costing practices of companies in a number of sectors of the economy, most notably coal, iron and steel, engineering and chemicals, i.e. those sectors where contemporaries considered cost calculation practices to have been most widely developed. In their study of integrated coal, iron and steel producers, Boyns and Edwards (1997) showed that, even before 1900, cost sheets were used to determine departmental costs of production, overheads were apportioned to identify total cost, and transfer prices were used to track the movement of goods between departments. Furthermore, they claimed that "a significant degree of diffusion was apparent in [these] key areas of accounting practice" during the second half of the nineteenth century (Boyns and Edwards, 1997: 20). Boyns and Edwards also found that the costing systems in use were fully integrated with the financial accounting systems, and that the cost accounts were usually half-yearly, though some firms drew up more regular sheets, e.g. monthly. Amongst colliery companies, Boyns (1993) found that extremely detailed cost sheets were often drawn up on a fortnightly basis, corresponding to the pay period used for miners. Again,

the emphasis was on total cost, i.e. including overheads, but the lack of financial accounts made it difficult to determine whether or not such cost accounts were tied in with the financial accounts, though there is evidence that this was the case for the Nostell Colliery, a small colliery in Yorkshire (ref. needed). Boyns and Wale (1996) have argued that while such cost sheets were originally used in the coal industry for purposes of cost finding, they increasingly came to be used as a key element in management information systems from the 1880s onwards. Furthermore, Boyns and Wale found that these management information systems became more sophisticated over time as colliery companies became larger and their organisational structures more complex.

Recent research into cost calculation practices in the chemical industry (Matthews *et al*, 2003; Boyns *et al*, 2004) has shown that, from the middle of the nineteenth century, a number of chemical firms actively developed their methods, despite the relative lack of any significant literature related to the topic of costing in the chemical industry. Indeed, during the second half of the nineteenth century and the early decades of the twentieth century, Boyns *et al* (2004) have shown that, in some respects, cost calculation practice was ahead of the techniques espoused in the literature, while in other respects it kept pace with it. Published research into firms operating in the engineering sector has been relatively limited, though unpublished results from on-going research are incorporated in Tables 1 and 2. Of the published sources, one recent study has been that of the development of cost calculation practices at the chain manufacturer, Hans Renold Ltd. (Boyns, 2003), while another has been that of the cost calculation practices of engineering firms operating in the west of Scotland conducted by Fleming *et al* (2000). Unfortunately, the latter work has only very limited value in respect to the current study since the authors only talk generally about the methods used during the period from c.1900 to c.1960, failing to provide precise details as to the dates to which any specific descriptions for any firm relate, and fail to indicate any details of changes in methods or when they might have occurred. Indeed, it is implicitly suggested that cost calculation methods did not change much over the period 1900-1960, in particular, there was little sign of any attempt by the firms studied to embrace more modern methods such as standard costing or budgetary control, though this is perhaps not altogether surprising since Fleming *et al* concentrated their attention on firms engaged in contract engineering, an area in which, *a priori*, one might have expected these techniques to have potentially afforded the least benefits over existing practices.

One general finding of Fleming *et al* which is of relevance to this study, however, is that estimates were at the heart of the cost calculation practices employed. These provided the basis for pricing individualised work, and in the larger works, though not the smaller ones where firms made do with "an annual profit and loss account and detailed knowledge of each job", comparisons were made between actual costs and estimates (Fleming *et al*, 2000: 205). Table 1, which focuses on the nature of the cost calculation or cost estimation procedures utilised by a number of engineering firms engaged in contract work but located in other parts of Britain, shows a similar result. The evidence presented in Table 1 suggests that all of the firms for which we have estimated cost figures around the time of the First World War used 'full' cost for estimating purposes, but while Thomas Hudson & Co. Ltd. included overheads as a percentage on labour costs, other firms applied figures, the basis for which is unclear. For several companies, most notably those for which we have actual, ex post, cost summaries for each job, overheads are included. For most companies there is evidence of a comparison

between actual and estimated costs, and the former with the selling price to give an indication of profit or loss on the job.

Table 2 reports certain results for a wide range of firms in both the engineering and related areas, and the chemical industry. It focuses on the nature of the various cost statements produced by the firms examined, which may be variously described as cost summaries, cost sheets, etc., and shows that many of them were carrying out regular cost calculation from an early stage, indeed, several as far back as the middle of the nineteenth century. Thus, the agricultural machinery manufacturer, Ransomes (of Ipswich), introduced an interlocking double-entry system of financial and cost accounts in 1856 (Reading, TR RAN AC5/6 and AD3/11). Other companies which were drawing up regular cost statements or analyses in the late 1860s or early 1870s included the Old Castle Iron & Tinplate Co. Ltd. (annual, half-yearly and quarterly 'manufacturing costs') (Swansea, Old Castle C38, C39) and the agricultural machinery manufacturer, Nalder and Nalder Ltd. (monthly figures) (Reading, TR NAL 334). By the early 1880s, the Old Castle Iron & Tinplate Co. Ltd. was producing half-yearly statements of manufacturing costs for each product (Swansea, Old Castle C38, C40), a practice which was still being carried out in 1928 (Swansea, Old Castle C41). By 1907, the company was producing fortnightly cost figures for the company as a whole (Swansea, Old Castle C17). Although no such cost sheets survive, the directors meeting minute books suggest that monthly costs had begun to be kept in 1870 (Swansea, Old Castle B/16, board minute for 5 Feb. 1870). The evidence presented in Table 2 suggests that overheads were often included in cost summaries, especially where these were for the company as a whole, as at Old Castle, Nalder & Nalder, Horseley Bridge, F.H. Lloyd, Hingleys, BSA, Hans Renold Ltd., British Xylonite, Winfields, and Baird's Gartsherrie iron works. Where only works costs figures have survived, it seems clear that these may have included some overheads but not all, such as at United Alkali, where general charges and a share of district office expenses were to be included for each works, but not any share of head office expenses. It is difficult to be categorical about whether costs were full costs or not due to the varied use of terminology, some companies using the same phrase, though possibly in different ways, while others favoured their own terminology. Thus, it is not always clear what is meant by 'general charges', and particularly terms specific to an individual firm, e.g. 'outside charges' at Winfields.

While it is difficult to be categorical regarding the inclusion of overheads in works costs, half-yearly or annual cost summaries were more likely to include them, possibly because these figures were extracted directly from the financial records after the event. The archives clearly reveal that cost information was being widely used for price estimation purposes at engineering companies, and that the basis for such exercises was similar, namely the inclusion of a percentage additions to labour costs, occasionally labour and material combined, to cover overheads. There is also evidence of a monitoring of these percentage additions by companies and alterations made thereto, in the light of under- or over-recovery of overheads. While in some cases these adjustments seem to occur annually, in other cases it was clearly done more regularly, and there is some evidence that such monitoring became more intense in the years leading up to the First World War. Other evidence of continuous/evolutionary change in cost calculation practices at certain companies is provided by minutes of board meetings and various memoranda contained in the archives. Thus, the archives of Hans Renold Ltd. reveal that c.1901 the company brought in A.H. Church to install a new cost system, a fundamental feature of this system being the use of his method of

overhead allocation based on scientific machine rates (Boyns, 2003). The system, however, did not remain static and underwent a number of modifications, even before the outbreak of the First World War. Another company which was concerned with methods of allocating general charges and head office expenses between its three works was N. Hingley & Sons Ltd., where an exchange on the topic with the company's auditors took place in 1911 (Dudley, Hingley Pt. 1/2).

At F.H. Lloyd's, the managing director, John Hemming, reported in December 1904 that while costs were kept in the pattern and fitting shops, there was a need for 'more accurate costs' in the foundry where, previously, only 'isolated instances of accurate costs' had been kept. He went on to note that he thinks that he has succeeded in introducing a system "that can be kept practically daily that will enable us to detect any leakages there may be on the small miscellaneous work which is now coming in" (Sandwell, 8807/6, ff.327-8 - all quotes in this paragraph taken from this source). He expressed the hope that the new system would not require more staff and though he noted that the new system was not complete "it is, I think, as good as our arrangements will permit". He noted that there was a problem a keeping the cost of each casting in a business where it was possible to receive orders in a single day for 220 castings comprising 24 different types. Detailed costs, he declared, would require "immense labour, involving considerable expense, and might even then be no more accurate than the system we have adopted".

Given that in most firms, their cost calculation practices invariably involved some element of estimation, the issue of reconciling the figures thrown up by these cost calculation procedures and the financial accounts was clearly a matter of concern. Even where systems were fully integrated, such as at the integrated coal, iron and steel companies examined by Boyns and Edwards (1997) or at Ransomes, there was still the need for a reconciliation of the cost and financial accounts. At Horseley Bridge, the company was conducting regular reconciliations between its profit and loss accounts and its cost accounts at least as early as 1909 (Stafford, 1288 B/3/6). Reconciliation was also an issue which concerned Hans Renold Ltd. since the company's 'expense rates' (their term for Church's scientific machine rates) increasingly tended to throw up costs which did not match up with actual expenses (Boyns, 2003).

The idea that cost calculation practices remained static before the First World War is clearly not supported by the evidence related above and/or contained in Tables 1 and 2. As one might expect, cost calculation practices varied between firms, even within the same sector, though it is perhaps worth noting that the firms listed in Tables 1 and 2 varied right across the size spectrum. Thus, not only in key sectors such as coal and iron and steel, but also in engineering and chemicals, there is evidence of a development in cost calculation practices, usually in an on-going, or evolutionary, fashion prior to the First World War.

2.2. The post-war situation

2.2.1 Contemporary views

Opinion after the war was divided as to the extent to which cost calculation methods were being used, and also as to their efficacy. A leader comment in *The Accountant* shortly after the First World War, claimed that more manufacturers were keeping cost accounts than had been the case five years before, with more thinking about installing costing systems (1919:

81). Contemporary opinion seems to agree that it was the larger firms which were more likely to have a cost system. Thus, in the "Notes & Comments" section of *The [Cost?] Accountant*, it was claimed in the early 1920s that most large companies had costing systems, though there was a lot of ground to be made up in this area by medium sized firms (1921-22: 177). Burton (1922: 265) echoed this view, claiming that almost every large factory had a costing department, and that they were generally controlled by a professional accountant. The relatively small number of large firms in Britain may explain why Cathles (1920: 256) felt able to suggest that possibly less than five per cent of manufacturers had installed proper costing systems, while Boyd (1919: 40) considered efficient costing systems to be "very, very rare".

That there was a wide diversity of cost calculation methods being used, even within industries or sectors, was spelt out by Blyth (1923: 120). Commenting specifically on costing in small businesses in the metal industries, Blyth notes that "The majority of works had in operation some form of costing, but with few exceptions costing had not been developed beyond the stage of arriving at some approximation to cost and would be concerned with the average cost of the unit of output of a variety of product - differing either in type or in size of the same type" (1923: 121). As late as 1927, Sampson considered that cost systems in many firms were still crude (1927: 964), while the Committee on Industry and Trade (1929: 225) noted the "lack of consistent and scientific practice amongst many firms in respect of costing accounts". While the committee considered that there were no doubt some perfect systems in operation, many others needed much improvement, despite the positive developments that had occurred since the time of the reports of the committees under the Profiteering Acts.

2.2.2 Archival evidence

Where available, Tables 1 and 2 above provide evidence relating to the cost calculation practices at the companies examined after the war. In many companies, there is little evidence of any significant changes in either the cost estimating procedures used, or the nature of cost statements produced, when comparing the post-war period with the pre-war one. Indeed, in many cases, the nature of the estimating procedures and the format of the cost statements appear to be identical over long runs of years spanning either side of the war. As noted above, the half-yearly product cost statements produced by the Old Castle Iron and Tinplate Co. Ltd. remained very similar between the early 1880s and at least 1928. Similarly, at British Xylonite, the same method of presenting actual monthly cost figures was being used in 1932 that had been used in 1888 (Ipswich, HC410/D1/2). This is not to argue, however, that there were no changes at during the period of the war. One of the most notable set of developments to occur was that at Hans Renold Ltd. where the company began to experiment with the use of budgeted expenses as the basis of its expense rate system c.1914/15, developed the use of standard costing in the company's shell department in 1918, and gradually evolved a fully-fledged system of standard costing and budgetary control between c.1918 and the mid-1920s (Boyns *et al*, 2000; Boyns, 2003). Another company which began to use budgets from c.1920 was BSA Ltd. (Boyns et al, 2000). In both these cases, however, there is little direct evidence to suggest that war-time controls directly led to these changes, though in the case of Hans Renold Ltd., the needs of war provided the opportunity to experiment with new ideas of cost calculation in one small part of the business.

In other key sectors of the economy at the time, however, there is little evidence of any major changes taking place in cost calculation practices. In both the coal and iron and steel sectors, the evidence tends to be more one of continuity and evolution rather than of any major significant changes to cost calculation practices. Boyns and Wale (1996) have shown that, as firms in the coal industry became larger and their organisational structures more complex, their management information systems, based around cost information, likewise became more detailed. Nevertheless, the basic structure of the cost calculation practices remained largely the same, and little evidence has been found of the introduction of techniques such as standard costing or budgetary control within the coal industry before the 1950s (Boyns, 1997). There is, however, some evidence that these techniques may have been introduced at the coal mines belonging to United Steel Companies Ltd., an iron and steel manufacturer which had begun to introduce these techniques generally from the late 1920s (Edwards *et al*, 2002). United Steel, however, appears to have been unique, even within the iron and steel industry, where accounting systems, embedded within an established organisation structure, proved to be not easily susceptible to change. Indeed, the specificity of firm's accounting systems, accompanied by diversity in accounting practice between firms, has been seen as a major obstacle in the path of the successful development of a uniform cost system for the iron and steel industry from the 1920s through to the 1960s (Edwards *et al*, 2003).

Overall, the overwhelming evidence from the major sectors examined, namely, the coal industry, the iron and steel industry, engineering and chemicals, is that of very little change in cost calculation practices between the pre-war and post-war eras. However, it is recognised that, while firms may have continued to present cost information in the same format before and after the war, this is not conclusive proof that no changes had taken place in the practices used to draw up the information contained in the various cost statements. However, without further information as to the nature of the systems and the changes therein, these statements remain, in many cases, the major source of evidence as to the nature and extent of any changes. In the light of this fact, it is somewhat unfortunate that the surviving archival records contain very few direct references in relation to the impact of war control on cost calculation practices (for more details of the few references, see the sub-section on archival evidence in the next section).

A comparison of the comments of contemporaries relating to the post-First World War era with those for the pre-war era does not, *prima facie*, provide support for the contention that the war had a major, positive impact upon cost calculation methods in Britain.

3. Assessing the impact of the First World War

3.1 Contemporary views

Following the formation of the ICWA in 1919, members of the executive committee of the Institute's council such as H.G. Jenkins and J.C. Todman, as part of the rhetoric/discourse surrounding the development of the cost accountancy profession, had talked about the work of cost and works accountants emerging from "obscure corners of great industrial concerns" (Todman, 1922: 179) and the profession of cost accountancy coming into the light (Leverhulme, 1922: 217). However, Todman clearly indicated that the work of cost and works

accountants had been going on "for many years". Thus, while the cost accountancy profession may have come into the light in recent years, there is no evidence in the statements of either Todman or Jenkins that cost calculation practices had developed and/or become more widespread during the war, rather that such practices had become more visible, especially to the general public. So how did contemporaries judge the impact of the First World War? Some clearly thought that it had had a major impact, whereas others viewed things differently.

During the war, Sir John Mann, in evidence before the Committee on Public Accounts in 1917, claimed that the records of many manufacturers were useless because they were in such a deplorable state. Those of many large firms "were absolutely antiquated" and there were no standardised procedures for bookkeeping, for financial accounting, or for production methods (Marriner, 1980: 462). In such circumstances it is not difficult to see that the intervention of individuals trained in up-to-date cost calculation practices could have had an important impact during the First World war. Indeed, it was claimed by officials that, as a result of cost investigations carried out by the Ministry of Munitions, "large areas of British industry were introduced to best-practice cost accounting formerly restricted to small numbers of firms" (Marriner, 1980: 463). Comments made by the leader writers of *The Incorporated Accountants' Journal* in March 1919 echoed this view:

> The recourse to cost investigations by Government departments and the results which have followed have been nothing less than a revelation to traders and manufacturers, many of whom have hitherto regarded cost accounts as an expensive luxury. When they were told that a costing system would show them where economies could be effected they were somewhat incredulous, but when professional accountants were deputed by the Government departments to investigate their accounts, and as a consequence the cost prices put forward by them were shown to be inaccurate, they began to realise that costing was more valuable than they had imagined - so much so that many of the investigating accountants employed by the Government have since found remunerative employment with the very firms whose accounts they examined. (1919: 104)

Elliot (1921: 467), commented that, as a result of the wartime cost investigations conducted by the Ministry of Munitions, "Costing, although just as important before the war as during it and after it, has come into its own", while Woolley, commenting during the discussion of Elliot's paper, noted that the war had taught us how to keep records, something which would be of great use in the future (Elliot, 1921: 473). While most comments were focused on the effects of the war on manufacturing businesses, Pulford (1927: 403-4) considered that a by-product of the war was the extreme care with which costing was being carried out in some of the country's big trading stores. Almost twenty years after the events, in addition to commenting that the war had brought cost accounts out of obscure corners and secret places into the open, Moran felt that the war had given many businessmen the first glimpse of costing as a means of controlling production (1936: 305). A specific instance of such changes was provided by Sir Lynden Macassey while discussing a paper presented by J.M. Fells in 1922. He commented on the fact that he had originally worked in a marine engineering shop at a shipyard and, having revisited this shop recently, he could not fail but to note "how the work [in that shop] was re-organised after the adoption of a system of cost

accounting by the Government …. [and] All kinds of improved methods and revised organisations had naturally followed" (Fells, 1922: 124).

But not all external commentators shared this belief in the benefits resulting from contact with the Ministry of Munitions and its costing system during the war. Loft herself, for example, has noted the comment in *The Accountant* in July 1919 that "In retrospect, after the war it was felt that costing investigations were not so effective as they could have been, one of the problems being the lack of training of those carrying them out" (quoted in Loft, 1986: 147). Unfavourable comments about the influence of wartime cost investigations abound in the first edition of *The Cost Accountant*, the journal of the ICWA, published in June 1921. Thus, in a comment on the final meeting of the Central Committee under the Profiteering Acts, it was noted that "the results of the various late government 'Costings Departments' have not been anything like a brilliant success and have undoubtedly been the cause of creating an unfavourable impression with most manufacturers as to the real necessity of an efficient costing system" (*The Cost Accountant*, vol. I: 2). Sir Herbert Austin remarked that everybody had complained about it: "the cost keeping of the Government, particularly during the War, was very very bad" (*The Cost Accountant*, vol. I: 22). Sir John Keane noted that, during the war, "amateurs who knew little or nothing about the subjects were put in all kinds of important positions" (*The Cost Accountant*, vol. I: 16). This would appear to include the costing arena:

> The writer had some rather amusing experiences during the War with Government inspectors who came to the Midlands to ‘spread the light’ as they put it, and bewailed the backward condition of the art of costing [in the heavy iron and steel trades]; but it was interesting to find that when it came to ‘brass tacks’ none of them were able to offer any practical alternative to existing methods, while some of them knew so little of the practical working of the industry as to give up any attempt to make a real check of the figures submitted. (Brown, 1921-2: 250)

Fells echoed the view that the costing methods imposed during the war were less than ideal, complaining that they were "rather based more on estimates than actual facts" and he expressed the hope for an improvement in methods during the 1920s (Elliot, 1921: 470). For Gill the problem was that the cost systems were imposed on certain industries from "outside", and hence were "not altogether a natural and, therefore, a sound growth" (1923: 331).

3.2 The archival evidence

There is little or no archival evidence of major changes to cost calculation practices during the First World War which resulted from the implementation of government control. Even in those cases such as that of Hans Renold Ltd. where changes can be clearly observed during the period of the war, these can be traced back to a desire to overcome problems with the existing system that went back several years before the outbreak of hostilities and would appear to bear no specific relation to the impact of war-time controls. At other companies, such as British Xylonite and Ransomes, post-war comments by individual intimately connected with the cost calculation processes stressed the continuity of systems with those developed way back in the nineteenth century rather than of any major breaks created by the war.

Thus, although the company's cost calculation practices had evolved since the late nineteenth century, British Xylonite's cost accountant, J.B. Rule, felt able to write, in 1936, following the introduction of a 'modern cost accounting system', that "It is pleasing to reflect that our present cost-accounting system, with all its analytical and calculating machinery, is the spiritual child of that system started by the late Mr. L.P. Merriam in 1879" (Rule and Bennett, 1936: 6). A similar comment had been made a few years earlier, c.1923/24, at Ransomes, by J.B. Reeve, the chief of the Wages and Cost Department. Reeve commented that the cost calculation system being used by the company was essentially the same as that introduced to the company in the late 1850s/early 1860s by R.C. Ransome. As Reeve pointed out, however:

> Naturally, as the years brought new developments in the business, it became necessary to make adaptations. A very complete method of arriving at expenditure of plant and fixtures has grown up, for instance, as also new methods for fixing percentages of this expenditure on wages for use in drawing up costs. Also a more elaborate system of detailing trade expenses or indoor expenditure has been derived, so that a more accurate percentage on wages can be arrived at for use in making costs. (Reading, TR RAN AD 3/11, ff. 102-3)

Despite these changes, Reeve felt able to conclude that "It is, nevertheless, an interesting fact that the methods designed nearly seventy years ago are practically those which are in use to-day" (Reading, TR RAN AD 3/11, ff. 102-3).

The evidence therefore suggests changes may have taken place in costing systems, but that these were not brought about by the result of war-time controls. The impact of such controls may well have influenced different sectors of the economy to varying degrees, not least because some sectors were more heavily controlled, and for a longer time period, than others. Amongst the major sectors to be affected were, of course, the coal, the iron and steel, the chemical and the engineering sectors. All of the companies studied in this paper, save perhaps for one or two of the very smallest engineering companies, e.g. Wantage, Hunt, etc., seemed to have been affected by government controls. Archival evidence indicating any major impact of these controls on cost calculation practices, however, is extremely limited. One sector where there was some concern expressed about the impact of government controls was the iron and steel industry, where works were taken under government control as from 8 November 1915. For those companies which also controlled coal mines, government control created problems, not least since part of their assets were now government controlled, while the rest were not (collieries were only taken under government control from late 1916/early 1917). At Bolckow, Vaughan & Co. Ltd. the chairman, Sir J.E. Johnson-Ferguson, indicated in his speech at the company's AGM held on 20 December 1916, that he was none too happy with the changes the company was forced to adopt as a result of war control. In particular he complained of the 'arbitrary line' that had been drawn through the middle of the company's accounts as a result of part of the company's business being controlled but the remainder not (Report of the Proceedings of the Ordinary General Meeting, 1916, p.9). In his statement at the following year's AGM held on 30 June 1917, he noted further disruption resulting from changes to the rules wrought by the Finance Act, 1917, which came into effect on 1 January 1917, and the taking under government control of the company's collieries (Report of the Proceedings of the Ordinary General Meeting, 1917, pp.18-19). The most significant

problems seem to have been faced by integrated concerns, i.e. those whose collieries were kept mainly, if not entirely, for the purpose of supplying their iron and steel furnaces with fuel. Although their cost calculation practices appear to have remained fundamentally unchanged during the war, integrated producers now found themselves having to make transfers of coal to their iron works at market (or controlled) prices rather than, as before the war, at cost (for further discussion of the issue of transfer pricing in integrated concerns in the late nineteenth century, see Boyns *et al*, 1999). Thus at the Consett Iron Co. Ltd., a board minute for 7 March 1916 records that "for submission to the Munitions Department, the Accounts of the Iron & Steel departments should be made up for the Standard period and afterwards on a Market price of Materials basis, and not as now on a Prime Cost basis" (Consett Iron Co. Ltd., Board minute book, vol. 16, min. 60). Surviving documentary copies of the profit and loss accounts detailing departmental profits show these being drawn up for the year ending 30 June 1917 on two different bases, one on the basis of market prices and the other on a cost basis (Consett Iron Co. Ltd., D/Co 90). Similar changes were made throughout the companies cost statements and cost books at this time.

Other experiences also shed light on government control. One such documented experience is that of Hans Renold Ltd., where stock valuation proved to be a matter of concern. It would appear that the problem stemmed from the company's use of Church's system of 'expense rates' which, being more complex than the practices advocated by the Ministry of Munitions, produced different stock valuation figures. A Board minute for 28 March 1916 records that the company's method of valuing stocks was causing concern, it being noted that if the Government required the company to re-write its stock values, this would be done "with the Establishment Charges included at 100% of Direct Labour Cost" (MCL, M501 650.0522 HR910/7, Head Office Meeting, 28 March 1916). A week later it was noted that the Ministry of Munitions had no desire to send an Accountant to Manchester to investigate the company's accounts and that, as long as the company had not changed its method of stock valuation during the period of assessment, it would be simpler to leave things as they were (ibid., 5 April 1916). Little evidence has been found elsewhere in the archives of the precise methods used by engineering companies to cost government contracts during the war, but a scribbled note in the Ransomes archive indicates that a rival firm, Reavills, costed Admiralty work in 1916 as follows:

> Labour + 75% + material
> to the sum of the above add 25% Establishment Charges
> & on to the total add 50%

(Reading, TR RAN AD2/2X, f.20)

The same source also reveals that at this time the Ransomes method, where material was supplied to the company. was simply to multiply the actual wages cost by 3, i.e. a mark-up of 200 per cent on the labour cost ((Reading, TR RAN AD2/2X, f.20).

In the chemical industry, C.F. Chance, of Chance & Hunt, in a series of lectures on costs to members of staff of the company and those at HM Factory, Oldbury (CRO, BM 20/179, Lecture 3, ff.2-3), criticised the costing methods used by the Ministry of Munitions in relation to the National Chemical Factories since they ignored depreciation, a practice which had been employed in his firm and several other chemical companies for some time (Boyns *et al*, 2004). Shortly after the war, two articles appeared in the *Journal of the Society of*

Chemical Industry making much play of advances in costing brought about during the First World War in the National Chemical Factories, especially in the provision of comparative data (*JSCI*, 1919; Curtis, 1921). While Curtis claimed that "During the past few years developments in the direction of more accurate and detailed costing work in chemical works has been rapid" (1921: 175T), the archival evidence is less than compelling, since what he considered to be the two main developments, process costing and the provision of comparative costs, have been revealed to already exist in a number of chemical firms, including Brunner, Mond & Co. Ltd., United Alkali Co. Ltd., Albright & Wilson Ltd. and British Xylonite Co. Ltd., prior to the First World War (Boyns *et al*, 2004). While for most of these companies there is no indication of any major changes in cost calculation practices as a result of the war, it should be pointed out that, in December 1918, United Alkali established a Reconstruction Committee, though the precise remit of this committee or the motives behind its establishment are not fully known at this stage in our work. The committee did, however, consider the company's cost accounts, making several recommendations, namely, that:

1. Cost sheets be got out quarterly by the various works;
2. All raw materials used to be debited in the cost books at average (paid by the works) rates. Variations in stock value to appear only in profit and loss accounts.
3. The cost to be the bare cost, including repairs.
4. Depreciation, standing Head Office changes and etc. to be fixed by Head Office.
5. Price of intermediate products from works to works to be fixed at Head Office on average of district costs and Head Office charges.

(CRO DIC UA 3/6, minutes of meeting held on 24 April 1919)

Regarding the suggestion that works general charges should be made on the basis of labour, it was decided to get a Mr. Carey to report on this issue. It has been already noted that United Alkali had attempted to impose a standardised system of cost accounts on its numerous works shortly after the formation of the company in late 1890. However, by the end of the war any standardisation seems to have been non-existent, it being recorded at a subsequent meeting of the Reconstruction Committee that "In the cost sheets for the six months ended 31 Dec. [1918] there is such a lack of uniformity in the compilation, and such obviously erroneous final costs, that comparison and analysis are impossible" (CRO DIC UA 3/6, minutes of meeting held on 8 June 1919). Although the war may have stimulated these developments at United Alkali, it is equally possible to argue that the changes were needed to restore the pre-war *status quo* by removing problems which had arisen as a result of the disruption caused by war-time controls.

4. Conclusion

In historical analysis, there have often been claims made that wars have had a major impact, only for subsequent generations of historians to argue that the impact was much less than that first suggested. This article should be seen in this mould, that is, as a revisionist analysis of the impact of the First World War on costing. By examining some of the surviving archival records of businesses operating both before and after the war, this paper has attempted to

overcome some of the problems faced by previous researchers such as Loft and Marriner, who have relied entirely on secondary sources and government records, and to try to resolve some of the differences of interpretation between these authors.

While Loft has clearly championed the cause of the First World War for bringing cost accountancy 'into the light', Marriner was much less sanguine about the impact of government war-time controls on cost calculation practices. In her detailed study of the Ministry of Munitions and government accounting procedures during the war, Marriner cast doubt on the long-term impact on cost calculation practices, basing her assessment largely on the negative findings of the investigations carried out by the Balfour Committee between 1924 and 1929 (1994: 468). Despite this, and recent comments by Fleischman and Tyson (2000), there nevertheless appears to be a commonly held view, following Loft, that the First World War had a major impact. An examination of some of the surviving business records for the period, however, has led us to the view that there are few grounds for believing that the First World War had much of an impact upon cost calculation practices. While the cost accountancy profession may have come into the light, it is not so clear that cost calculation practices were revolutionised by the First World War. All of the firms examined in this paper utilised some method of cost calculation prior to the First World War, though the nature of such practices varied, both between firms within the same sector and between firms in different sectors of the economy. To presume, as many commentators seem to do, that there was little or no cost calculation before 1914 and that cost calculation began with the First World War is a view that is clearly mistaken and in the light of the steadily growing evidence, no longer tenable. British firms were carrying out cost calculation practices to inform pricing policies and to aid business decision-making before the First World War. Whether such methods were good or bad is difficult to judge, not least because the meaning of terms such as 'good' and 'bad' is unclear in the context of the time period being discussed. Pejorative judgements of cost calculation procedures utilised are difficult to make without a clear statement of what methods should have been used. Indeed, without a clear definition of what is meant by a 'sophisticated' costing system, the term used by Loft, it is impossible to judge whether the cost calculation procedures found were sophisticated or not.

The evidence produced in this paper throws doubt upon the claim that the First World War had a major impact on cost calculation procedures, not least by suggesting that many companies already had practices in place, and that these appear to have changed little or not at all as a result of the war. While this throws doubts upon claims that government war-time controls effected improvements in the practices of companies where cost calculation was already conducted, it has not been possible to say anything about what happened at firms where no such methods existed before the war, if there were any. One reason for this, of course, is the fact that none of the firms whose records have been examined were found to be in this position, all firms utilising some method of cost calculation. None of this is to argue that cost calculation practices did not change over time, indeed the evidence presented above has shown that they did. It is, however, to argue that accounting change was generally evolutionary in nature, and that any changes noted, including those which occurred during or immediately after the war, were often merely part of such on-going evolutionary changes and not the result of specific changes wrought by government control during the First World War.

It is recognised that our work cannot provide definitive results because of its failure to consider firms that did not calculate their costs before the First World War. It has also been limited by its focus on certain firms in four sectors, though these were all ones that were

significantly affected by government controls during the First World War. Nevertheless, our research needs to be accompanied by research into more businesses, especially those operating in other sectors, most notably textiles and clothing. Studies of firms in these other sectors, together with studies of other firms in those sectors covered by the research reported here, would clearly add to our knowledge of the impact of the war, if any, on cost calculation practices. In particular, it would be informative if archives could be located of firms which did not have cost calculation methods in place before the First World War and which implemented some such method as a result of their war-time experiences.

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