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Public governance of private munitions businesses in regional Britain, the case of Wales, 1938 to 1945

Abstract

This article analyses the public governance of the private British munitions industry from 1938 to 1945. It uses a case study of Wales to make two arguments. One is that public regional governance was contested and slow to emerge, although ultimately successful. Governance was initially centralised and uncoordinated as three supply ministries competed to source munitions. Floorspace controls were introduced in 1941 but ministries rebuffed other attempts to co-ordinate regional procurement. However, capacity problems throughout Britain incentivised co-operation from 1942, when a new Ministry of Production created effective regional structures. The other argument is that business activity in Wales intensified as structures emerged. Mobilisation focused initially on concentrations of secondary manufacturing, but Wales was dominated by primary industries and few businesses were producing munitions by mid-1940. Nevertheless, air raids and capacity shortages elsewhere prompted an influx controlled increasingly by regional structures that governed a munitions industry dominated by private businesses.

Introduction

Rearmament in Britain accelerated throughout the 1930s and munitions production grew to eventually dominate a centrally planned wartime economy. By 1943, all aspects of such production employed more people than served in the armed forces; 5.2 million to 4.8 million.¹ Production from private and government factories grew more than six-fold between late 1939 and the peak of early 1944 when average weekly output exceeded 500 aircraft, 3,000 tons of bombs, 450 artillery pieces, 1.5 million shells and mines, 700 armoured vehicles, 33,000 small arms and eight warships.² While the state owned and managed some large factories, most munitions were produced by private businesses fulfilling orders for one of the government's procuring ministries. By 1942, for example, 1.38 million people were producing munitions ordered by the Ministry of Supply, 1.1 million of whom worked for private businesses.³

The literature on the second world war is vast, but while researchers such as Peden, Broadberry and Howlett have explored wartime economic strategies,⁴ studies of production governance have focused instead on pre-war rearmament across two stands of research. One is service specific. Forbes explored the shadow factory scheme enabling automobile businesses to produce aircraft, arguing that the state 'recoiled from the idea' of state-run factories.⁵ Gordon argued that delays to naval procurement were caused by factors including the government's 'doctrine of normal trade', while Miller highlighted how the state failed to create sufficient shipbuilding capacity while policy implementation was hindered by factors including the complexity of Whitehall committee structures.⁶ The other strand focuses on general governance. Shay argued that normal procurement methods combined with financial rationing to form a 'less than adequate organizing principle', while Rollings traced debates between those favouring greater state intervention, and those emphasising a continuation of normal

commercial approaches, with the latter prevailing.⁷ Finally, Gibbs argued in his official history that the preparation of rearmament programmes was not constructed ‘according to one plan’, prompting a governance system tactfully described as ‘fairly coherent’.⁸

Meanwhile, the combined public governance of all munitions production during wartime has been neglected, especially once the generalised focus on ‘normal trade’ apparent in the 1930s was progressively discarded after 1940. The few business history studies focus on individual industries. Edgerton examined how the state supported and then directed businesses to equip the air force from 1935 to 1948, while Howlett explored how the state allocated capacity within the steel industry from 1939 to 1945, again through directing private companies.⁹

There are three reasons why the totality of wartime industrial mobilisation has been neglected. The first is that examinations of interaction between state and business focus on the Board of Trade, whose activities included controlling the production and consumption of goods other than munitions. Nevertheless, three supply ministries procured munitions and governed their production, financially supported private businesses, and revitalized regions most affected by interwar depression by mandating the dispersion of private industrial activity. However, works including those by Wren on industrial subsidies and Parsons on regional policy focus instead on Board of Trade planning for post-war reconstruction.¹⁰ Other Board of Trade activities are neglected, such as the licensing of industrial floorspace throughout the regions; mechanisms that segued into post-war regional policy instruments diverting industry to state designated ‘development areas’.¹¹

The second reason is that mobilisation depended on public governance processes described by Crowcroft as ‘unglamorous’ and by Edgerton as ‘immensely complex’.¹² Even the memoirs of

Oliver Lyttleton, Minister of Production from 1942 to 1945, lack detail of what he described as ‘tedious’ governance processes.¹³ Neglect of public industrial governance can be highlighted by reference to the Lord President’s Committee, created in 1940 to mediate between ministers on home front topics including production. Despite the central importance of the committee in setting national policy, a recent study by Crowcroft was the first detailed examination of its work, arguing that there was ‘no integration of [the Committee] into the historiography of the period’.¹⁴

The final reason is the continued dominance of the government’s official histories as secondary sources, although these are now some seventy years old. Their authoritative nature stems from their status as the culmination of large-scale research programmes. Data gathering began as early as December 1941 when academic researchers interviewed senior civil servants at the Board of Trade, and by the following year historians had been seconded to ministries to prepare confidential narratives.¹⁵ These narratives were incorporated into a twenty-eight volume civil series published from 1949, within which seven on war production emerged from 1953. While these are invaluable sources, officially supervised research written during and shortly after the events they describe hold obvious drawbacks, such as their focus on departmental activity at the expense of regional and private actors.

Nevertheless, a reconsideration of the general processes surrounding industrial mobilisation is underway. In a series of works, Edgerton has argued that Britain was a ‘warfare state’ for much of the twentieth century. He rejects the ‘standing alone’ narrative that can dominate accounts of the war, as well as arguments that the Ministry of Labour and National Service was of paramount importance in enabling industrial mobilisation through a ‘people’s war’.¹⁶ Edgerton argues instead that the ‘warfare state’ emphasised science and technological innovation, using

governance machinery to enable the mass production of munitions. Administrative strength enabled the mobilisation of domestic industry, while military strength enabled the maintenance of international trading links that supported and complemented domestic production through large-scale imports of munitions, machinery, and raw material.¹⁷

But the governance processes that enabled such industrial mobilisation have been neglected. For example, although Todman argued in his surveys of Britain's wartime experience that public governance machinery developed in 'fits and starts' and the 'organisers, not the improvisers' eventually prevailed, the breadth of his work precluded analysis of production governance.¹⁸ Moreover, studies with a greater focus on production tend to examine aspects other than governance. Examples include Coombs exploring tank technology and the analysis by Jeffreys of tensions within Churchill's coalition government.¹⁹ Finally, regional mobilisation is almost entirely absent from the literature, despite the deployment of governance structures to co-ordinate business activity.²⁰

This article aims to address this gap by examining the public regional governance of the private munitions industry. Our research question is: how did the state mobilise the private munitions industry in Wales? Wales has two merits as a case study. One is that it lacked autonomous governance structures and was administered as a region of England. Administrative submergence meant that the mechanisms of government, and the structures developed to co-ordinate munitions production in Wales, were mirrored throughout all British regions; there were no 'Wales only' aspects. The other is that the dependence of the Welsh industrial economy on coal mining, and iron and steel production, prompted deep depression between the wars. Consequently, Wales had a labour capacity comprised of unemployed people, and unoccupied females excluded from the male dominated pre-war labour market. Labour availability meant

that Wales became a focus for mobilisation and the creation of new, privately operated, factories.

The article draws on data held by the UK's National Archives to make two arguments. One is that regional governance was contested and emerged slowly, although it was ultimately successful. Governance was initially centralised and uncoordinated as three supply ministries competed to source munitions. Floorspace controls were introduced in 1941 but ministries rebuffed other attempts to co-ordinate their regional procurement. However, capacity problems throughout Britain incentivised co-operation by 1942, when a new Ministry of Production created effective regional structures. The other is that business mobilisation in Wales intensified as structures emerged. Mobilisation focused initially on concentrations of secondary manufacturing, but Wales was dominated by primary industries and few businesses were producing munitions by mid-1940. Nevertheless, air raids and capacity shortages elsewhere prompted an influx that was gradually subjected to greater state direction, and regional governance structures emerged to successfully marshal a munitions industry dominated by private businesses.

The remainder of this article is structured as follows. The next section discusses rearmament and business in Wales between 1934 and mid-1938. Subsequent parts set out longitudinal data on the allocation of industrial floorspace, discuss the governance of the munitions industry in Wales across three periods between 1938 and 1945, before concluding.

Initial rearmament and business in Wales

Rearmament in Britain gained momentum throughout the 1930s, and associated expenditure more than trebled between 1934 and 1938.²¹ However, the pace of rearmament varied by service, led by the Royal Air Force. Meanwhile, each service depended on munitions procured by one of three competing ministries, the Air Ministry, the Admiralty, and the War Office. A Minister for Co-ordination of Defence was appointed in 1936 but without powers of direction, while regional mechanisms to co-ordinate munitions production did not exist.

Accelerating rearmament and generalised economic recovery had little impact in Wales. Even as unemployment reached 32.3 per cent of the insured workforce in 1934,²² efforts to attract peacetime factories failed. In 1935, for example, 213 factories opened in London compared to none in the south Wales coalfield.²³ Industrialists saw Wales as a peripheral location with poor industrial relations. They were reluctant to invest, views shared within government. From 1934, fear of wartime air raids prompted the state to disperse activity from its Royal Ordnance Factories (R.O.F.s) located in or around London. But Wales was rejected by two successive inter-departmental committees as ‘transferred men [...] might not like the class of house available’, while officials argued that manufacturing supply chains were absent.²⁴ In 1936 a third committee eventually selected Bridgend for an ammunition filling R.O.F., and an explosives R.O.F. was approved in the subsequent year, but financial constraints delayed the construction of both.²⁵

Attempts to attract private or state-run munitions engineering facilities to Wales also struggled. The Air Ministry constructed shadow factories for automotive companies to produce aircraft and components. These overlapped with agency factories operated privately for fees calculated

from construction and management costs, and units produced.²⁶ However, management decided on factory locations, preferring those near industrial concentrations, none of which were in Wales. The government asked the Rootes automotive company to manufacture airframes in Wales, but it refused for 'fear of labour troubles'.²⁷ A Vickers bomber factory was approved at Broughton in 1937, but the site was within a few hundred meters of the border and was chosen because of its proximity to suppliers elsewhere, becoming known as the 'Chester plant' after the adjacent city. From 1936, the War Office built engineering R.O.F.s but none were in Wales due to concerns as to the lack of skilled labour and specialist supply chains. Finally, the Admiralty constructed a state-run propellant factory in Wales from 1938 and built ships throughout Britain in private and state-owned yards. However, there were no large private yards in Wales where the only Royal Dockyard, at Pembroke, had closed in 1926 although the Royal Air Force subsequently established a seaplane base.²⁸

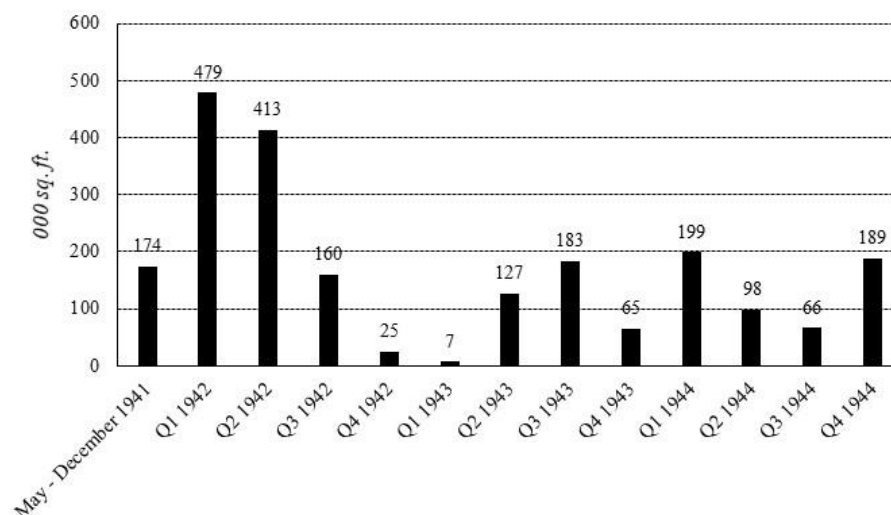
Few businesses in Wales had been contracted to produce munitions by 1938. These included Imperial Chemical Industries (I.C.I) constructing factories to produce ammonia and methanol for explosives R.O.F.s, and Edward Curran, a Cardiff based foundry, producing cartridge cases from 1937.²⁹ Rearmament was a national priority but had little impact on private industry in Wales, where the unemployment rate in 1938 was almost double that throughout Britain.

Industrial floorspace, 1938 to 1945

The usage of regional industrial floorspace by businesses producing munitions was unregulated and unrecorded from 1938 to 1941, but a licensing system for the acquisition of, or transfers of activity within, all floorspace by private businesses was introduced in early 1941. The Board of Trade operated a Factory and Storage Space Control function that generally allocated space

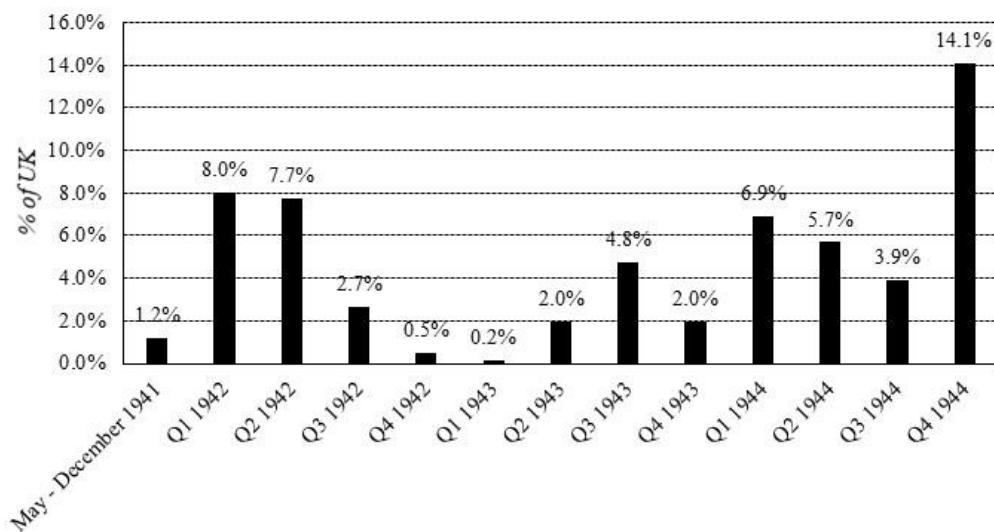
to only those companies under contract to a supply ministry. Between May 1941 and December 1944, 2.1 million sq. ft. of existing industrial floorspace was allocated to munitions production in Wales (see graph 1). Most was requisitioned from peacetime industries although other spaces were also taken. Allocations fluctuated to average 3.5% of the UK total but peaked at 479,000 sq. ft. in the first quarter of 1942, 8% of the UK total (see graph 2). Meanwhile, in 1939 Wales possessed 3.3% of all UK employees, but less than 1.5% of those within secondary industries, primarily manufacturing and construction.³⁰

Graph 1: Floorspace licensed for munitions production, Wales, 1941 – 1944 ('000 sq. ft.)



Source: TNA, BT 131/28, The Control of Factory and Storage Space, annexes.

Graph 2: Floorspace licensed for munitions production, 1941 – 1944, Wales (percentage of UK allocations).



Source: TNA, BT 131/28, The Control of Factory and Storage Space, annexes.

Some construction took place if floorspace for requisition could not be found where labour was available, but such activity was tightly regulated. Construction licences, known as ‘nil certificates’ were required from August 1941 although extensions to existing factories were exempt.³¹ Between August 1941 and December 1944, supply ministries obtained licenses for 775,600 sq. ft. for munitions businesses in Wales; 7.9% of all such construction permitted throughout the UK.

Three periods are discernible when analysis of public governance of the private munitions industry in Wales is combined with these data. The first is from mid-1938 to mid-1940, when the approach and subsequent outbreak of war prompted greater production. During this period public governance remained fragmented, floorspace was unregulated and regional structures to govern private contractors were lacking. The second is from mid-1940 to mid-1942, beginning with a new coalition government. Industrial activity grew rapidly as businesses relocated to

avoid air raids, and then to access labour reserves in Wales. Most of this influx was enabled by the supply ministries but circumstances were chaotic until floorspace licensing was introduced in May 1941. Meanwhile, the government experimented unsuccessfully with regional governance structures to co-ordinate munitions businesses. The final period is from February 1942 until the end of the war, when the establishment of effective regional governance structures under a new Ministry of Production enabled industrial production to be co-ordinated and directed.

Mid-1938 to May 1940

The likelihood of war was increasingly apparent by the mid-1938 Sudeten crisis, and generalised and long-standing concerns accelerated to prompt the creation of a Ministry of Supply in mid-1939. But the government rejected full powers of direction over industry as it wanted to generally maintain normal commercial approaches to procurement, instead choosing the weakest governance model that was politically feasible.³² The new ministry inherited War Office procurement functions over army supplies and some common items, but its powers were restricted; the Admiralty and the Air Ministry argued that their specialised procurement skills would be diluted by a merger and remained separate.³³

The outbreak of war saw little change to production governance. The three supply Ministries placed contracts with private businesses through some thirty centrally managed Britain-wide production directorates; ‘watertight concerns’ that competed with each other and prevented regional co-ordination.³⁴ Ministries employed regional officers, but they had no authority over regional staff working for production directorates. In early 1940 the government created Area Boards throughout Britain from regional representatives of the supply and other ministries,

ostensibly to co-ordinate production but they lacked authority, their secretariat was usually one retired civil servant and their activities had little impact. One activity was to exhibit a few items for inspection by businesses to tender for their manufacture, but eighty percent of tenders received were for wooden boxes.³⁵ Boards were supported by twenty-member advisory committees including ten nominated by industrial employers, but these unwieldy bodies had little to do and most expired quickly.

The Ministry of Supply initially subsumed Wales into a West of England Area as there were 'no big munitions contracts [in Wales] and [it] largely supplies raw materials and heavy industrial work'. Industrialists in Wales were furious at their inability to obtain contracts and in January 1940, the Cardiff-based *Western Mail* editorialised that there was 'nothing comparable [in Wales] with the war purposes activity of 1914-18' while 'hundreds of small firms wait on the doorstep for orders'.³⁶ An Area Board for Wales was established in March 1940 but had little impact given broader constraints. Nevertheless, two of the three supply ministries were establishing state owned and managed factories in Wales. By mid-1940, six Ministry of Supply R.O.F.s were under construction or entering production. These were located at: Bridgend and Glascoed to fill ammunition; Wrexham and Pembrey to manufacture explosives; and Cardiff and Newport to produce engineered munitions. The Admiralty also managed a propellant factory at Caerwent. Meanwhile, some business activity took place as I.C.I manufactured the chemicals necessary to produce explosives in two agency factories by early 1940, although the largest initially employed only 150 people.³⁷

While the Ministry of Supply and the Admiralty operated their own factories, the Air Ministry procured munitions from agency factories. Although aircraft production remained concentrated in industrial centres elsewhere, the government incurred £1.1 million on construction and

£432,560 on equipment at the Vickers bomber plant near Chester.³⁸ The factory received its first contract, to assemble 750 Wellington bombers, in May 1939 and the first aircraft flew in August. Each was assembled in sixty hours using components sourced from just-in-time supply chains drawing on private businesses throughout Britain. Although the plant was state owned, it was managed privately by Vickers and all sub-contractors supplying components and sub-assemblies were also private businesses. Some employed just a handful of staff and struggled financially; their owners visiting the factory weekly to collect cheques to enable their employees to be paid.³⁹ Meanwhile, the Air Ministry was also funding the construction of plants in Wales to manufacture light alloys, again to be managed by private companies.

Although the *Economist* argued in April 1939 that 'Britain's rearmament programme is the greatest public works programme ever devised in time of formal peace',⁴⁰ private production was emerging only slowly in Wales and activity was dominated by state factories. Meanwhile, public governance structures to control private production were embryonic. Unemployment remained at 17.5% of the insured workforce in February 1940 when the *Western Mail* asked; 'the women are waiting, as are the unemployed men, where are the jobs?'⁴¹

May 1940 to February 1942

The military crisis of mid-1940 and the formation of Churchill's coalition government prompted three reforms to boost production and improve co-ordination between supply ministries and munitions businesses. The first was a new Ministry of Aircraft Production to inherit Air Ministry functions and exploit its emerging network of privately managed factories to boost production.

The second was factory allocation to manage chaotic competition between supply ministries. Each ministry was independently requisitioning factories throughout the regions only to find that occupying businesses were already producing munitions for another ministry. After Churchill overruled opposition from the Ministry of Aircraft Production, a Factory and Storage Control Function was created in early 1941 to prevent ‘factory snatching’.⁴² The new control could not be housed by one of the supply ministries given their reluctance to co-operate, and it was instead placed within the Board of Trade.⁴³ The control licensed the take-up and construction of all industrial floor space and concentrated some industries into fewer factories to release space. While supply ministries remained centralised, the control depended on locally knowledgeable regional staff to carry out what its Controller General Cecil Weir defined as the ‘cruel work’ of requisitioning factories and reallocating them to other businesses to produce munitions.⁴⁴

The third and least effective reaction was the May 1940 creation of a Production Council that assumed responsibility for Area Boards, but it was a ministerial committee with little authority. The absence of authority created a regional administrative gap as the Council’s Area Boards throughout Britain could not regulate businesses fleeing air raids on London. In late 1940, for example, the Midlands Area Board covering cities including Birmingham argued that allowing non-essential businesses to move to the region was ‘suicidal’ while the North Western Area Board covering cities including Manchester objected to one arrival as ‘knitwear hardly sounds important [to the war effort]’.⁴⁵ Criticism mounted, and in January 1941 a Production Executive replaced the Production Council. But it also lacked authority and achieved little, and the failure to co-ordinate production became a political battleground.

While debate raged, two regional problems emerged. One was the inability of supply ministries to control industrial minutiae, and the other was the need to co-ordinate contracting businesses. The answer to both was regional governance but three reviews in 1940 and 1941 achieved little, as supply ministries lacked any incentive to cooperate as sufficient capacity still existed in many regions. The first was in May 1940, when Harold Macmillan, Parliamentary Secretary at the Ministry of Supply, reviewed Area Boards for the Production Council. He concluded that they were 'enfeebled' by a lack of authority, but supply ministries continued to ignore Area Boards. Failure prompted a second and equally unsuccessful review, in December 1940, that produced plaintive recommendations including 'giving the boards specific tasks to perform'.⁴⁶ Macmillan carried out a third review, in 1941, arguing that planning failures had left some regions overloaded with production, but others underused.⁴⁷ The subsequent reorganisation achieved little beyond rebranding the Area Boards as Regional Boards.⁴⁸ The renamed boards searched for a function throughout 1941 when the *Times* described them as having 'no certain place in the scheme of administration' as they 'scarcely know what they are expected to do'.⁴⁹

Meanwhile, the Wales Area Board was tasked to co-ordinate munitions production but in October 1940 was unable even to obtain guidance from the Ministry of Supply on its production priorities.⁵⁰ The mid-1941 rebranding to Regional Boards achieved little in Wales apart from creating three sub-regional advisory panels formed from employer and union representatives. In December 1941, the Wales Regional Board Chair Herbert Hiles complained about the dismissive attitude of regional staff within supply ministries. He threatened resignation, arguing to his Whitehall superiors that 'the prestige of certain individuals and departments should mean nothing at all in days such as these'. Simultaneously, his Board Secretary, Denis Morgan, compared inter-departmental tensions to war in Libya before informing his superiors that 'we plod on, saddened but undismayed'.⁵¹

Tensions meant that the Regional Controller of the Board of Trade's Factory and Storage Control Function labelled the Wales Regional Board as 'waste of time' and refused to join.⁵² His refusal was significant as the control, described by Wales Assistant Controller Emrys Price as a 'vast estate agency, armed with powers to take what we wanted', was the main instrument co-ordinating munitions businesses.⁵³ The percentage of floorspace the control allocated to businesses in Wales grew from 1.2 per cent of the UK total from May to December 1941, to 8 per cent in the first quarter of 1942 when 479,000 sq. ft. was allocated (see graphs 1 and 2). Meanwhile, a steady flow of businesses arrived in Wales from mid-1940. While early arrivals were seeking safety from air raids, the government noted later that by 1941 'the general labour situation in England grew tighter' and ministerial influence 'was progressively exerted toward the creation of more industrial capacity in Wales'.⁵⁴

Labour availability combined with the beginnings of governance through floorspace allocation enabled the three supply ministries to drive mobilisation in Wales with scant regard to co-operation. The first ministry was the Ministry of Supply that governed privately owned and managed factories fulfilling Ministry contracts. A few contracts were placed through Percy Thomas, the Ministry of Supply's Regional Controller for Wales but he initially held the post on a part-time, unpaid basis and continued his private architectural practice. He had little contact with other ministries and worked informally, travelling throughout Wales to find capacity 'at unexpected little factories' while if he received a request to place larger contracts, he asked contractors 'to come to his office and see [...] if they could meet the requirements'.⁵⁵

Most contracts were placed instead by centralised ministry directorates that managed their own regional staff. They focused initially on repurposing and expanding the few existing factories, mostly in the industrialised south. One example was a former telephone factory in Merthyr

Tydfil that was converted and expanded to employ over 2,000 workers producing guns, fuses and cartridge cases for the Birmingham Small Arms company.⁵⁶ Factories elsewhere included a cable works producing torpedoes and a metal goods plant making bomb components, while one factory employed 2,500 workers producing desert uniforms and ‘overcoats for Russia’.⁵⁷ Demand saw businesses spread to rural areas where they assembled jeeps in garages and manufactured fuses in a stately house ballroom.⁵⁸ Most rural factories were small, but one exception was a slate mining explosives manufacturer where some 700 staff produced hand grenades.⁵⁹ All these factories were privately managed.

The Ministry also owned and managed six R.O.F.s. By the end of 1941, two filling factories employed 44,490 people, two explosive factories employed 11,450, and two engineering plants employed 4,946.⁶⁰ But even within these factories, business was not excluded. I.C.I operated agency plants producing chemicals for explosive R.O.F.s, designed and built a factory for the Ministry to produce ammonia nitrate, and from early 1941 operated a secret subterranean agency factory producing mustard gas for chemical warfare.⁶¹ Finally, R.O.F.s often recruited their management from businesses. From 1942, for example, the Bridgend R.O.F. superintendent was Len Corbett, previously manager of a Fry’s Chocolate factory.⁶²

The second supply ministry was the Ministry of Aircraft Production. It had a Wales regional officer, but he did not even know what contracts had been placed in his region; his Ministry argued that such data would ‘overload [him] with paper’.⁶³ This Ministry did not operate factories, instead placing contracts with, and supporting financially, private businesses including those relocating to Wales. Many were supported including, as examples, four on which the Ministry spent £363,285 to construct or refurbish 241,000 sq. ft., and a further £157,938 on purchasing equipment.⁶⁴ The first was Rollason Aircraft Services, whose London

factory was damaged by an air raid on 15 August 1940. Within two weeks, the Ministry and company management had identified a slate quarry at Llanberis in Snowdonia as an alternative location. Machinery was transported from London to the quarry where 3,000 employees worked in sheds and tunnels.⁶⁵ The second was Daimler moving some engine production from Coventry to Bangor, while the third was Saunders Roe refurbishing seaplanes on Anglesey, in addition to those at its Isle of Wight facility. Finally, the Ministry built a component plant at Llandudno for the Ratcliffe Engineering Company in eighteen weeks.⁶⁶ Meanwhile, Treforest Industrial Estate, established by the government in 1937 to attract private occupiers, grew in importance as it offered some modern factories for requisitioning. Thirty-seven tenants were evicted, for example, to enable the British Overseas Aircraft Corporation to relocate production from London. Estate employment almost doubled from 6,141 people in 1940 to 11,843 in 1942 as new operations arrived and existing businesses switched to war work and expanded.⁶⁷

The final supply ministry was the Admiralty that managed a propellant factory where one worker recalled ‘six or seven thousand people working’.⁶⁸ When developing private capacity, however, the Admiralty often preferred to place contracts with shipbuilding and heavy engineering facilities used during the First World War.⁶⁹ However, such facilities were rare in Wales, where most sites fulfilling contracts were small ship repair yards or boatyards, with the latter often requisitioned for relocated boatbuilders. Some other contracts, however, were placed with private businesses such as for the manufacture of ammunition components.

Despite the upsurge in contracting with private businesses, the supply ministries still refused to co-operate with each other, as suggested by an Admiralty memo on regional production: ‘a supply department’s job is to get the supplies it wants [...] it is not concerned [...] with seeing that the whole of the country’s war industry is used to the best effect’.⁷⁰ Industrial flows were

unregulated until the Factory and Storage Control function was created in 1941. The lack of controls barely mattered when labour capacity in Wales was sufficient to easily absorb the inflow. But unemployment, which stood at 86,984 people in December 1940, was falling rapidly although some local pockets remained, as did larger reserves of unoccupied female labour.⁷¹ Nevertheless, generalised discontent as to the overall governance of production remained even as output grew: in January 1942 the *Western Mail* reported on the Regional Board's defensive investigation of questions raised by munitions workers, including 'why should we be slack, even idle, when there is all this call for more production'.⁷²

February 1942 to August 1945

The government created a Ministry of Production in February 1942 as concerns over production peaked. Concerns were driven by labour shortages and worries as to efficiency but were given more force by military reversals such as the fall of Singapore. However, interdepartmental disputes raged over the remit of the new Ministry and Lord Beaverbrook resigned as Minister of Production shortly after his appointment.⁷³ The central problem faced by Beaverbrook's successor, Oliver Lyttleton, remained the supply ministries; he argued later that they 'would not take readily to interference'.⁷⁴ Meanwhile, the government saw regional governance as a key problem, and in February 1942 commissioned the fourth review in two years. The review board membership reflected the government's desire to act decisively; most were regional board chairmen and the chair was Trades Union Congress General Secretary Sir Walter Citrine.

In May, the Citrine Committee reported a 'melancholy list of frustrations and disappointments', arguing that 'an efficient regional organisation is an essential element in the effective

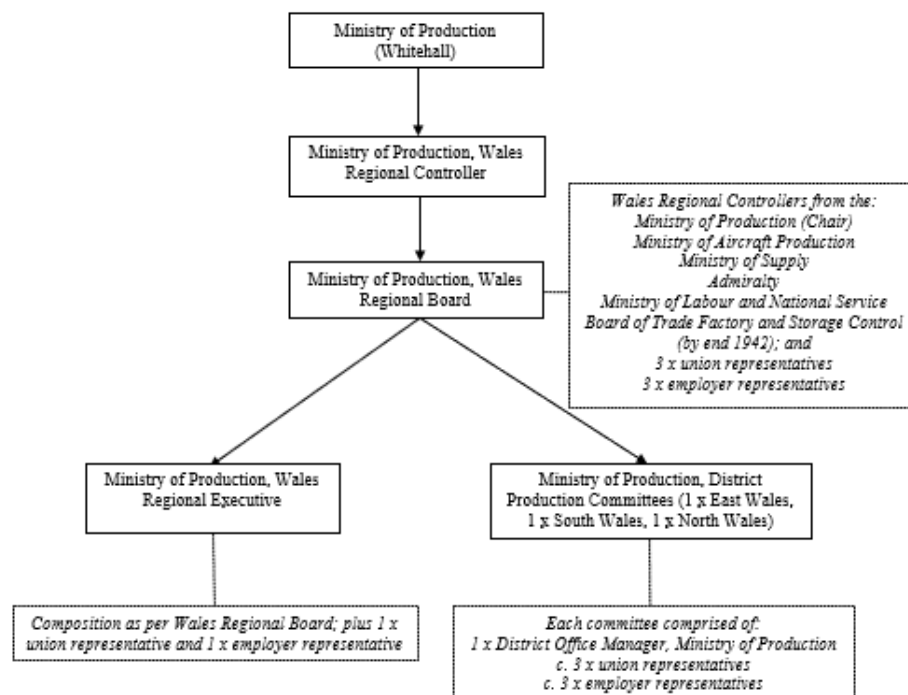
prosecution of the war' before identifying two barriers to greater regional production. One was the 'strange' lack of effective regional structures governing production.⁷⁵ The other was poor co-operation between supply ministries, with the Ministry of Aircraft Production admitting that it functioned 'largely independently of the Regional Boards' even though it was represented on all such boards.⁷⁶ But familiar themes re-emerged as recommendations to give regional boards authority over supply ministry relationships with business were rejected, although boards were to oversee new district offices to survey localised production capacity.⁷⁷

Nevertheless, circumstances finally delivered a solution to the problem of regional co-ordination. In October 1942, Lyttleton argued that a 'general expansion in productive capacity' throughout Britain was almost complete and that 'readjustment and reallocation of resources' was necessary to ensure continued growth.⁷⁸ Capacity shortages meant that supply ministries were incentivized to co-operate. Crucially, the few remaining labour reserves were scattered regionally, gifting a role to the recently strengthened regional structures of the Ministry of Production. Full time Regional Controllers were in place by mid-1942, with all regional staff in supply and production ministries obliged to share offices while district offices were opened.⁷⁹ With the Ministry of Supply centrally processing 41,600 contracts in mid-1942,⁸⁰ Regional Boards were not designed to control all activity of the three supply ministries but instead to co-ordinate their interactions with business by matching contracts with companies, authorising factory expansions and openings, and tracking capacity utilisation.

Lyttleton attended the Wales Regional Board of 3 July 1942 to stress the 'vital importance [...] of additional regional devolution in production administrative matters'.⁸¹ He promptly appointed Ministry of Supply Regional Controller Percy Thomas as his Ministry of Production Regional Controller to preside over a three-tier structure in Wales (see chart 1) mirroring

structures elsewhere. The first was a regional board, comprised of one representative from each of the three supply ministries, the Board of Trade, the Ministry of Labour and National Service, joined by employer and union representatives. The second was a regional executive to carry out board decisions, formed from the same ministerial representatives, but fewer from employers and unions. The final tier was three area advisory committees, drawn from both sides of industry and each linked to a new district office.⁸² Co-operation was driven by co-locating regional staffs of all ministries, but residual problems remained as the Admiralty refused initially to release office space in Cardiff; an act the Regional Board described as ‘threatening to neutralise the whole value of [our] work’.⁸³

Chart 1: Ministry of Production regional governance structure, Wales, 1942 to 1945



Source: HoC, Report of the Commission on Regional Boards, Cmd 6360, May 1942. 22-23.

The Regional Board had no formal authority over supply ministries; an attempt by its chair in March 1943 to ‘remove feelings of jealousy between departments’ by obtaining such authority failed.⁸⁴ Authority was instead derived from three sources reflecting how public governance emerged through improvisation to enable effective industrial planning. The first was the goodwill of the supply ministries, as circumstances forced co-operation. The second was the board’s collation of capacity data to enable local conditions to be monitored and controlled. The board employed staff at its new district offices to visit at least two firms daily to gather data on production load and potential.⁸⁵ Data were recorded on machine readable cards to enable localised and intra-regional comparisons.

The third source was the ability of the Regional Board to absorb and deploy the authority held by the Board of Trade. After protracted interdepartmental disputes, the Board of Trade’s Regional Controller of Factories and Storage Space finally joined the board in late 1942,⁸⁶ and floorspace decisions were generally agreed collectively. Crucially, in November 1942 the controller told the board that he saw Wales as a ‘reception area for small units of production’, and that ‘where pockets of available labour existed, he would [...] make every effort to secure the necessary premises for production’.⁸⁷ Securing premises meant more allocations; 4.2% of floorspace allocated throughout the UK from the second quarter of 1942 to early 1944 was in Wales (see graph 2), some 2 million sq. ft.

Authority enabled the board to assume a clearing function for expansions of existing businesses and the arrival of new factories. Meanwhile, the focus of munitions production in Wales shifted away from state owned and managed R.O.F.s towards private businesses. By 1942, filling and explosives R.O.F.’s throughout Britain were producing more ammunition than could be used or stockpiled. Production was reduced and employee numbers at the four such factories in

Wales fell from 51,300 in the second quarter of 1942 to 37,561 by the end of 1943, a decline of 27%.⁸⁸ Engineering R.O.F.s were unaffected and a third in Wales began production in 1942 although these factories employed fewer than the other R.O.F. types.

However, reduced demand for ammunition was offset by greater demand for aircraft and their components as the air force assembled a strategic bomber fleet; quarterly national production of heavy bombers grew from 266 in early 1942 to 1,447 in early 1944.⁸⁹ Employment at the Vickers airframe factory at Broughton reached 6,443 in late 1943, but all other aircraft related activity in Wales was component production. Such activity grew quickly as the Ministry of Aircraft Production built capacity through the Factory and Storage Control Function's issuance of 'nil certificates' for factory construction. By 1943, almost 15% of all certificates issued throughout the UK to the Ministry of Aircraft Production related to businesses in Wales.⁹⁰ These certificates were necessary as few factories or other spaces remained available for requisition for use by private businesses, forcing the Ministry and other supply ministries to requisition car and bus garages, market halls, gymnasiums, and brickworks.⁹¹

By late 1942 the Regional Board was inundated with two types of enquiries. One was for new private factories funded by supply ministries, such as a proposal supported by the Ministry of Aircraft Production to establish a sub-assembly plant employing 200 people, although labour shortages meant that the board wanted the Ministry to justify its choice of location before proceeding.⁹² This Ministry was particularly active and by 1945, seventeen private companies producing aircraft components and specialist metals were operating in almost three million sq. ft. of government owned factories in Wales, on which the Ministry had spent over £8 million on refurbishment and equipment. Most were operated by their tenants on 'commercial terms'

where rent was paid, but five were on 'agency terms' where a fixed fee was paid to the tenants based on metrics including government capital invested, and production volumes.⁹³

The other type of enquiry was from businesses wanting to requisition premises or expand existing factories. These included Standard Telephones and Cables which required 50,000 sq. ft. in December 1942 to fulfil Ministry of Aircraft Production contracts. The requisition and expansion of a chocolate factory to deliver floorspace required authorisations from the Factory and Storage Control Function as well as the Ministries of Production, and Aircraft Production. All such authorisations were within the remits of their regional officers, co-ordinated by the Regional Board. Even small expansions required approval, with an application involving fifty new jobs at the Saunders Roe seaplane facility authorised in December 1942.⁹⁴

By mid-1943 a Nuffield College reconstruction survey of south Wales observed that 'in the past year, the flood of enquiries for factory space has swollen still further [with] dozens of highly desirable industries turned away because every available building has long ago been requisitioned for government contractors [...] firms which had refused to consider south Wales [were] now anxious to be allowed to come here'.⁹⁵ Demand enabled the board to direct factory location, with labour shortages at Treforest Industrial Estate from 1943 prompting employment to be diverted to where labour capacity still existed. Estate employment peaked at 15,781 in 1943 before declining as the Board redistributed private employment elsewhere even as overall national production peaked in early 1944.⁹⁶

By 1944 Wales was studded with munitions businesses and Regional Board Chair Percy Thomas argued that war had 'brought a very great expansion and diversification of industry to the region'.⁹⁷ Although the total workforce in Wales grew only marginally from 696,000 in

1939 to 699,000 in 1944, its structure changed across two factors. One was gender as the number of male workers fell from 602,000 to 480,000 due to military conscription, but the number of female workers rose from 94,000 to 219,000. This growth was driven by industrial conscription as the Ministry of Labour and National Service mobilised those excluded from the male dominated pre-war labour market, enabling the female workforce in Wales to increase by 134 per cent, far more than the 30 per cent average across Britain.⁹⁸ Conscription gave female workers great importance throughout the workforce. As examples, 55 per cent of the 12,800 workers producing munitions at the Edward Curran company in south Wales were female, while high proportions were found across all ROFs by 1942, such as 53 per cent in the Newport engineering factory, and 59 per cent in the Bridgend filling factory.⁹⁹

The other factor driving change was occupational. Peacetime manufacturing reduced to a minimum as munitions expanded: those working in chemicals, engineering and vehicle construction were overwhelmingly producing munitions and total employment grew from 22,000 people in 1939 to 147,000 in 1944.¹⁰⁰ Although the state managed R.O.F.s and Admiralty facilities employed around 56,000 people in 1944, equivalent to 38 per cent of chemicals, engineering and vehicle construction employees, the balance of 62 percent worked within private factories. The pace of expansion within munitions production meant that the Factory and Storage Control Function recorded the creation of 173 new private factories in Wales between September 1942 and December 1944 as their number increased from 822 to 995.¹⁰¹

The extent to which supply ministries worked jointly to mobilise private capacity was symbolised by the complex owned and managed by the long-established foundry and engineering firm of Edward Curran, mostly in Cardiff although a subsidiary factory was built

elsewhere. The company owned and managed brass foundries fulfilling contracts for the Ministry of Supply and the Admiralty; a cartridge case factory for the Admiralty; a foundry manufacturing tank tracks for the Ministry of Supply; an aircraft repair facility for the Ministry of Aircraft Production; and engineering facilities contracted to all three ministries. Production totals were substantial and included 54.9 million cartridge cases, 3 million incendiary bomb cases, 4.3 million aircraft cannon projectiles, 611 lathes and machine tools, and 1.3 million tank track links.¹⁰²

Overall, the Wales Regional Board governed the distribution of the private munitions industry. As the war wound down in March 1945, for example, it rejected a Ministry of Supply proposal to extend a radio factory to employ a further 315 people given labour shortages in the proposed location, although it approved seven expansion projects elsewhere for goods including chemicals and optical equipment where labour was available.¹⁰³ The success of regional governance meant that structures outlasted the war. In August 1945, the Board of Trade thanked the Board and its counterparts throughout Britain for their ‘excellent work’, before retooling them for use within the regional policy apparatus being constructed by the new Labour Government to address regional economic imbalances.¹⁰⁴

Conclusion

The literature on Britain during the Second World War is vast but the public governance of wartime industrial mobilisation has been little studied, with research tending to focus on pre-war rearmament. Although Edgerton and Todman have recently emphasised the critical importance of imported munitions, machinery, and raw materials to the war effort, as well as how domestic production was planned around strategic priorities,¹⁰⁵ the governance of

businesses to enable these plans to be delivered is understudied. This article has sought to address this gap through asking: how did the state mobilise the private munitions industry in Wales? We make two arguments; their contours are reflected within regions throughout Britain as identical governance structures existed in each.

The first argument is that regional governance was contested and emerged slowly, although was ultimately successful. In 1938, public governance of munitions production was dominated by supply ministries responding to government demands, and each managed production as they chose. By the outbreak of war, ministries could own and operate their own factories, construct factories to be managed privately in return for agency fees, or sub-contract production to private companies, some of which were allocated state-constructed factories and state-provided capital investment. Meanwhile, each ministry contracted private businesses, but while the Ministry of Supply and the Admiralty operated their own factories, the Ministry of Aircraft Production did not.

Crucially, departures from the ‘business as normal’ governance approach that characterised many elements of 1930s rearmament were gradual and reluctant. Extensions of state control were reactive solutions to capacity problems, as the government preferred to react initially through voluntaristic approaches where weak governance structures lacked the authority to co-ordinate constituent elements. Authoritative governance mechanisms were not usually introduced unless voluntaristic approaches failed. Such an approach meant that different elements of munitions governance developed at varying speeds. An industrial floorspace crisis arrived first and required immediate resolution through compulsion; the ‘emergency estate agency’ of the Factory and Storage Control Function, based within the Board of Trade to ensure neutrality between feuding supply ministries. This function channelled large volumes of private

industrial activity to Wales by allocating requisitioned space and construction licences. Nevertheless, supply ministries retained discretion over regional munitions procurement.

Meanwhile, capacity availability enabled supply ministries to ignore the Area Boards created in 1940 until constraints finally incentivised their involvement in regional structures by 1942. Co-operation enabled the government to avoid endowing the newly created Regional Boards with formal authority over supply ministry activities, and a form of administrative voluntarism prevailed. The purpose of the Regional Boards was to unify the diverse strands of public governance into manageable units where information could be shared to enable private munitions businesses to be co-ordinated, while identifying and exploiting local pockets of labour capacity. These goals were achieved, and boards became effective agents of industrial planning. Debates over production receded as the economy headed towards peak mobilisation, the fortunes of war shifted, and large-scale imports arrived. Nevertheless, boards had no influence over national production priorities and programmes which remained centralised by necessity, operating through consent in a fluid administrative environment.

The evolution of regional governance structures was paralleled by the changing nature of relationships between munitions businesses and the state. In 1940, such relationships were informal. When, for example, Rollason Aircraft Services wanted to relocate to north Wales in August 1940, permits or official authorisations were barely required. By the following year, however, similar relocations required authorisation from the Factory and Storage Control Function, and from mid-1942 relocations were also subject to the cross departmental remit of the Wales Regional Board.

The second argument is that business mobilisation in Wales intensified as structures emerged. Mobilisation focused initially on concentrations of secondary manufacturing, but the industrial economy of Wales was dominated by primary activities and was seen as lacking a skilled labour force, especially within engineering. Some state-owned R.O.F.'s entered production by 1940 but few private businesses were producing munitions. One exception, however, was the Vickers-Armstrong aircraft plant at Broughton but it was officially and symbolically known as the 'Chester plant'. The paucity of contracts placed in Wales meant that unemployment remained high in mid-1940, and industrialist discontent mounted.

But air raids and subsequent capacity shortages elsewhere prompted an influx of factories, gradually subjected to greater state direction. New factories joined existing plants switching from peacetime goods to munitions production. Inflows continued after the air raid threat lessened because of greater labour availability compared to elsewhere, primarily unoccupied females subject to industrial conscription. From 1942, ammunition surpluses prompted employment to fall in most state-owned R.O.F.'s, but declines were offset by the continued inflow of private factories, mostly contracted to, and often financially supported by, the Ministry of Aircraft Production. While Wales had struggled to attract factories throughout the 1930s, war reversed this dynamic and by 1944 most munitions employees worked for private employers ranging from small workshops to large factories employing thousands of people, all marshalled by regional governance structures.

In conclusion, munitions production depended to a large extent on private businesses operating within Edgerton's all-encompassing 'warfare state'. Public governance of these businesses was improvised and inconsistent, but also pragmatic and effective, relying eventually on regional structures to sustain mobilisation. Although governance structures were consistent across all

regions, the pace of rearmament in each was influenced by their industrial inheritances. Wales was marginalised until 1940, but it then became a focal point for a large-scale, state sponsored, migration and mobilisation of private business. Although munitions production reduced from 1944, Wales was established as a location for state-directed but privately managed investment. Such investment continued to be directed to Wales by post-war Board of Trade regional policy that owed much to wartime approaches; the state constructed factories before deploying locational permits and financial support to divert businesses. Many located on the three R.O.F. sites repurposed as industrial estates, all of which remain important manufacturing locations.

¹ Gowing. *The Organisation of Manpower in Britain*, 150.

² Harrison. *A Volume Index of the Total Munitions Output of the United Kingdom, 1939-1944*, 665-666.

³ The National Archives (Hereafter TNA), 102/272, *Ministry of Supply, Note on Responsibility for Production and Labour Supply*, 4 December 1942.

⁴ Broadberry and Howlett. 'The United Kingdom: 'Victory at all Costs''; Howlett, *New Light Through Old Windows*; Peden, *Arms, Economics and British Strategy*, 164-228.

⁵ Forbes. 'Democracy at a Disadvantage?', 67.

⁶ Gordon. *British Seapower and Procurement*, 264; Miller. 'Planning and Profits', 222.

⁷ Shay. *British Rearmament in the Thirties, Politics and Profit*, 289; Rollings. *Whitehall and the Control of Prices and Profits*, 538-539.

⁸ Gibbs. *Grand Strategy*, 767.

⁹ Edgerton. *Technical Innovation, Industrial Capacity and Efficiency: Public Ownership and the British Military Aircraft Industry, 1935-48*; Howlett, *Resource Allocation in Wartime Britain: The Case of Steel, 1939-45*.

¹⁰ Parsons. *The Political Economy of British Regional Policy*, 47-68; Wren, *Industrial Subsidies, The UK Experience*, 29-31.

¹¹ Gooberman. *From Depression to Devolution, Economy and Government in Wales, 1934-2006*, 51-57.

¹² Crowcroft. "'Making a Reality of Collective Responsibility': The Lord President's Committee, Coalition, and the British State at War, 1941-42", 540; Edgerton, *Britain's War Machine*, 200.

¹³ Lyttleton. *The Memoirs of Lord Chandos*, 286.

¹⁴ Crowcroft. *Making a Reality of Collective Responsibility*, 540.

¹⁵ TNA BT 138/28, *Note of Talk with Miss Elroy and Sir C. Weir, Board of Trade*, Professor Hancock, 23 December 1941.

¹⁶ Calder. *The People's War, Britain 1939-45*.

¹⁷ Edgerton. *Technical Innovation*; Edgerton. *Britain's War Machine*; Edgerton. *Warfare State: Britain, 1920-1970*, 59-88.

¹⁸ Todman. *Britain's War, Into Battle, 1937-41*, 593, 617.

¹⁹ Coombs. *British Tank Production and the War Economy*; Jeffreys, *The Churchill Coalition and Wartime Politics*, 61-84. A similar approach is taken by: Todman. *Britain's War, A New World, 1942-45*, 261-268.

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- ²⁰ Welsh structures are discussed briefly in: Rowlands. *Something Must be Done-South Wales Versus Whitehall 1921–1951*, 155-157.
- ²¹ Peden. *British Rearmament*, Appendix III.
- ²² Williams. *Digest of Welsh Historical Statistics 1700–1974*, Vol. 1, 144.
- ²³ *Third Report of the Commissioner for Special Areas*, 8.
- ²⁴ TNA LAB 25/6, *Committee on Removal of Ordnance Factories*, 7 November 1935, 3.
- ²⁵ TNA CAB 102/627, *Construction of Filling Factories*, 6.
- ²⁶ Ashworth, *Contracts and Finance*, 150.
- ²⁷ TNA CAB 23/87, *Cabinet Papers*, 25 January 1937.
- ²⁸ Phillips. *Pembroke Dockyard and the Old Navy*, 46-48.
- ²⁹ *The War Effort at the Curran Works*, 1.
- ³⁰ Williams. *Digest of Welsh Historical Statistics 1700–1974*, Vol. 1, 135; ONS, *Long-term Trends in UK Employment: 1861 to 2018*. Figures 2a, 6.
- ³¹ TNA BT 138/28, *Note for Professor Hancock*, December 1941, 3.
- ³² Shay. *British Rearmament in the Thirties, Politics and Profit*, 274.
- ³³ Scott and Hughes. *The Administration of War Production*, 16-18, 77.
- ³⁴ TNA 102/503, *The Regional Organisation of the Ministry of Supply*, 2.
- ³⁵ TBA CAB 102/613, *Notes on the Development of Regional Organisation*, 3; TNA 102/503, *The Regional Organisation of the Ministry of Supply*, 4.
- ³⁶ ‘Wales not Neglected, say Ministry.’ *Western Mail*, 23 January 1940; ‘Wales and the Ministry of Supply.’ 23 January 1940.
- ³⁷ Rowlands, *Something Must Be Done*, 152.
- ³⁸ TNA CAB 102/274, *Government Owned Factories Operated by Contractors on Agency/Commercial Terms*, 1945.
- ³⁹ Smith. *Hawarden, A Welsh Airfield, 1939-1979*, 32-33.
- ⁴⁰ *The Economist*, ‘British Budgets.’ 22 April 1939.
- ⁴¹ Williams. *Digest of Welsh Historical Statistics*, 146; ‘Mobilising Nations’ Resources.’ *Western Mail* 27 February 1940.
- ⁴² TNA BT 138/28, *Talk with Miss Elroy and Sir C. Weir, Board of Trade*, Professor Hancock, 23 December 1941.
- ⁴³ TNA CAB 102/100, *The Control of Factory and Storage Premises*, 23-24.
- ⁴⁴ Weir. *Civilian Assignment*, 48.
- ⁴⁵ TNA BT 168/135, *Reports from Area Boards*, November 1940.
- ⁴⁶ TNA CAB 102/613, *Notes on Regional Organisation*, 4, 6.
- ⁴⁷ TNA BT 168/32, *Matters of Policy Requiring an Early Decision by the Production Executive*.
- ⁴⁸ TNA CAB 102/613, *Notes on Regional Organisation*, 8.
- ⁴⁹ ‘Realities of Supply.’ *The Times*, 21 May 1941.
- ⁵⁰ TNA BT 168/116, *Suggestions by Area Boards for the Greater Utilisation of Industrial Capacity*, 29 October 1940.
- ⁵¹ TNA BT 168/41, *Letter from Wales Regional Board Chair to Production Executive*, 3 December 1941; *Letter from Wales Regional Board Secretary to the Production Executive*, 2 December 1941.
- ⁵² TNA BT 168/32, *Summary of Regional Board Matters for the consideration of Mr Bevin*, 12 September 1941.
- ⁵³ Pride. *Tinman’s Progress*, 27.
- ⁵⁴ House of Commons (Hereafter HoC), *Wales and Monmouthshire. A Summary of Government Action 1st August 1945-31st July 1946*, Cmd 6938, 5.
- ⁵⁵ Thomas. *Pupil to President, Memoirs of an Architect*, 42.

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- ⁵⁶ TNA BT 168/5, *Letter from Wales Regional Board*, 20 July 1943, 3; Rowlands. *Something Must Be Done*, 157.
- ⁵⁷ Womens' Archive of Wales, *Voices from the Factory Floor*, Margaret Chislett, <http://www.factorywomensvoices.wales/uploads/VSE012.2.pdf>, 2; Baber and Thomas, 'The Glamorgan Economy, 1914-1945'. In *Glamorgan County History, Volume V*, edited by. John and Williams, 564.
- ⁵⁸ *Clwyd At War*, 45.
- ⁵⁹ *Voices from the Factory Floor*, Susan Jones, <http://www.factorywomensvoices.wales/uploads/VN016.2.pdf>, 6.
- ⁶⁰ TNA LAB 12/82, *Ministry of Labour and National Service Monthly Reports*, 17 November 1941, 8; TNA CAB 102/272, *Employment at ROFs 1939-1943*.
- ⁶¹ TNA AVIVA 22/3337, *History of Factory Activities: Rhydymwyn*, 10.
- ⁶² Clubb, *The Welsh Arsenal*, 84-85.
- ⁶³ TNA BT 188/127, *Regional Functions of the Ministry of Aircraft Production*.
- ⁶⁴ TNA CAB 102/274, *Government Owned Factories Operated by Contractors on Agency/Commercial Terms*, 1945.
- ⁶⁵ Chambers. *Bless 'Em All*, 55.
- ⁶⁶ Hughes. *The Second World War in the Borough of Conwy*, 10-11.
- ⁶⁷ Percival. *The Government's Industrial Estates in Wales 1936-1975*, appendix.
- ⁶⁸ Carradice. *Wales at War*, 78.
- ⁶⁹ Hornby. *Factories and Plant*, 59-60.
- ⁷⁰ TNA BT 168/126, *Admiralty Note on Functions of the Regional Board*.
- ⁷¹ Williams. *Digest of Welsh Historical Statistics*, 146.
- ⁷² "Whys" of Welsh War Workers Answered', *Western Mail*, 29 January 1942.
- ⁷³ Jeffreys. *The Churchill Coalition and Wartime Politics*, 91-92.
- ⁷⁴ Lytton. *The Memoirs of Lord Chandos*, 284.
- ⁷⁵ HoC, *Report of the Commission on Regional Boards*, Cmd 6360, May 1942. 7.
- ⁷⁶ TNA BT 168/27, *Letter from Ministry of Production to Secretary of the Regional Boards Committee*, 20 March 1942; *Report of the Commission on Regional Boards*, 8.
- ⁷⁷ TNA CAB 102/613, *Regional Boards, Minister's Duties and Programme*, 103.
- ⁷⁸ *The Times*, 'Strengthening the Controls', 15 October 1942.
- ⁷⁹ TNA CAB 102/613, *Regional Boards, Minister's Duties and Programme*, 105.
- ⁸⁰ Ashworth. *Contracts and Finance*, 76.
- ⁸¹ TNA BT 168/29, *Regional Board Minutes*, 3 July 1942.
- ⁸² *Western Mail*, 'District Offices for Welsh Production', 3 September 1942.
- ⁸³ TNA BT 168/29, *Regional Board Minutes*, 28 September 1942; 2 November 1942.
- ⁸⁴ TNA BT 168/12, *Wales Regional Board, Suggestions for Regional Organisation*, 26 March 1943.
- ⁸⁵ TNA BT 168/13, *Regional Controllers Conference*, 8-9 Nov 1944.
- ⁸⁶ TNA CAB 102/100, *Regional Controllers of Factory and Storage, and Regional Board Organisation*, 41.
- ⁸⁷ TNA BT 168/29, *Regional Board Minutes*, 23 November 1942.
- ⁸⁸ TNA CAB 102/272, *Employment at R.O.F.s 1939-1943*.
- ⁸⁹ *Statistical Digest of the War*, 152.
- ⁹⁰ TNA BT 131/28, *The Control of Factory and Storage Space, annexes*.
- ⁹¹ TNA BT 168/29, *Regional Board Minutes*, 9 April 1945.
- ⁹² TNA BT 168/29, *Regional Board Minutes*, 2 November 1942.
- ⁹³ TNA CAB 102/274, *Government Owned Factories Operated by Contractors on Agency/Commercial Terms*, 1945.
- ⁹⁴ TNA BT 168/29, *Regional Board Minutes*, 14 December 1942; 21 December 1942.

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- ⁹⁵ TNA BT 64/3153, *Nuffield College Reconstruction Survey, South Wales Reports*, 1943.
- ⁹⁶ TNA BT 168/41, *Ministry of Production, Wales Regional Board*, November 1942; Percival. *The Government's Industrial Estates in Wales*, Appendix.
- ⁹⁷ 'Bright Prospects for Welsh Industry', *Western Mail* 19 September 1944.
- ⁹⁸ Thomas, 'Post-War Expansion.' In *The Welsh Economy, Studies in Expansion*, 30; Williams. *A Forgotten Army, Female Munitions Workers of South Wales 1939-1945*, 14.
- ⁹⁹ *The War Effort at the Curran Works*, 18; TNA CAB 102/272, *Employment at R.O.F.s 1939-1943*.
- ¹⁰⁰ Thomas, 'Post-War Expansion.' In *The Welsh Economy, Studies in Expansion*, 31.
- ¹⁰¹ TNA CAB 102/272, December 1943 and May 1944 data; TNA BT 131/28, *Control of Factory and Storage Space, annexes*.
- ¹⁰² *The War Effort at the Curran Works*, 19.
- ¹⁰³ TNA BT 170/215, *Regional Board Minutes*, 5 March 1945, 4-6.
- ¹⁰⁴ TNA BT 168/13, *Conference of Chairman of Regional Boards*, 22 August 1945; Gooberman and Curtis. 'The Age of Factories: The Rise and Fall of Manufacturing in South Wales, 1945–1985.' in *New Perspectives on Welsh Industrial History*, edited by Miskell (Cardiff, 2020).
- ¹⁰⁵ Edgerton. *Britain's War Machine*; Todman, *Britain's War*; Peden, *Arms, Economics and British Strategy*.

Bibliography

- Ashworth, William. *Contracts and Finance*. London: HMSO, 1953.
- Baber, Colin and Denis Thomas. "The Glamorgan Economy, 1914-1945", in *Glamorgan County History, Volume V*, 519-575, edited by Arthur H. John and Glanmor Williams. Cardiff: University of Wales Press, 1980.
- Broadberry, Stephen and Howlett, Peter. "The United Kingdom: 'victory at all costs'", in *The Economics of World War II: Six Great Powers in International Comparison*, edited by Mark Harrison, 43-80. Cambridge: Cambridge University Press, 1998
- Calder, Angus. *The People's War, Britain 1939-45*. London: Johnathan Cape, 1969
- Chambers, Reg. *Bless 'Em All*. Wrexham: Bridge Books, 1995.
- Clubb, M.J. *The Welsh Arsenal*. Bridgend: Gwasg Blaen-y-Wawr, 2007.
- Coombs, Benjamin. *British Tank Production and the War Economy*. London: Bloomsbury Academic, 2015.
- Crowcroft, Robert. "'Making a Reality of Collective Responsibility': The Lord President's Committee, Coalition, and the British State at War, 1941–42," *Contemporary British History*, 29:4 (2015): 539-562.
- Edgerton, D.E.H. "Technical Innovation, Industrial Capacity and Efficiency: Public Ownership and the British Military Aircraft Industry, 1935-48", *Business History*, 26:3 (1984) 247-279.
- Edgerton, David. *Britain's War Machine*. London: Penguin, 2011.
- Edgerton, David. *Warfare State: Britain, 1920–1970*. Cambridge: Cambridge University Press, 2006.
- Forbes, Neil. 'Democracy at a disadvantage? British rearmament, the shadow factory scheme and the coming of war, 1936-40' in *Economic History Yearbook/ Jahrbuch für Wirtschaftsgeschichte* (2014) (49–70).
- Gibbs, N.H. *Grand Strategy, Rearmament Policy*. London: HMSO, 1976.
- Gooberman, Leon. *From Depression to Devolution, Economy and Government in Wales, 1934-2006*. Cardiff: University of Wales Press, 2017.

Gooberman, Leon and Ben Curtis, "The Age of Factories: The Rise and Fall of Manufacturing in South Wales, 1945–1985", ed. Louse Miskell *New Perspectives on Welsh Industrial History*. Cardiff: University of Wales Press, 2020.

Gordon, G.A.H. *British Seapower and Procurement Between the Wars*. Anapolis: Naval Institute Press, 1988.

Gowing, Margaret. "The Organisation of Manpower in Britain during the Second World War," *Journal of Contemporary History*, 7:1,2 (1972): 147-167.

Harrison, Mark. "A Volume Index of the Total Munitions Output of the United Kingdom, 1939-1944", *Economic History Review*, 43 (1990): 665-666.

Howlett, Peter. "New Light Through Old Windows, A New Perspective on the British Economy in the Second World War," *Journal of Contemporary History*, 28 (1993): 361-379.

Miller, Christopher. *Planning and Profits, British Naval Armaments Manufacture and the Military Industrial Complex, 1918-1941*. Liverpool: Liverpool University Press, 2018.

Peden, G. C. *Arms, Economics and British Strategy: From Dreadnoughts to Hydrogen Bombs*. Cambridge: Cambridge University Press, 2007.

Howlett, Peter. "Resource Allocation in Wartime Britain: The Case of Steel, 1939-45," *Journal of Contemporary History* 29:3 (1994): 523-544.

Hughes, A. *The Second World War in the Borough of Conwy*. Conwy: Conwy Town Council; 2019.

Jeffreys, Kevin. *The Churchill Coalition and Wartime Politics*. Manchester: Manchester University Press, 1991.

Lewis, J. Parry. "Post-War Expansion" in *The Welsh Economy, Studies in Expansion*, 30-50

Phillips, Lawrie. *Pembroke Dockyard and the Old Navy: A Bicentennial History*. Stroud, History Press, 2014.

Lyttleton, Oliver. *The Memoirs of Lord Chandos*. London: Bodley Head, 1964.

Parsons, Wayne. *The Political Economy of British Regional Policy*. London: Routledge, 1988.

Peden, G. C. *British Rearmament and the Treasury, 1932-1939*. Edinburgh: Scottish Academic Press, 1979.

Percival, Geoffrey, *The Government's Industrial Estates in Wales 1936–1975*. Treforest: WDA, 1978.

Postan, M.M. *British War Production*, London: HMSO, 1952.

Pride, Emrys. *Tinman's Progress*. Swansea: University College, Swansea, 1959.

Rollings, Neil. "Whitehall and the Control of Prices and Profits in a Major War, 1919-1939," *The Historical Journal*, 44:2 (2001), 517-540.

Rowlands, Ted. *Something Must be Done-South Wales Versus Whitehall 1921–1951*. Merthyr Tydfil: TTC Books, 2000.

Scott, J.D. and Hughes, R. *The Administration of War Production*, London, HMSO, 1955.

Shay, Robert Paul. *British Rearmament in the Thirties, Politics and Profit*. Princeton: Princeton University Press, 1977.

Smith, David J. *Hawarden, A Welsh Airfield, 1939-1979*. Wigan: 1980.

Statistical Digest of the War. London: HMSO, 1951.

The War Effort at the Curran Works, Cardiff: Edward Curran and Company, 1945.

Third Report of the Commissioner for Special Areas. London: HMSO, 1937.

Thomas, Percy. *Pupil to President, Memoirs of an Architect*. Leigh-on Sea: F. Lewis, 1963.

Todman, Daniel. *Britain's War, Into Battle, 1937-41*. London: Allen Lane, 2017.

Todman, Daniel. *Britain's War, A New World, 1942-45*. London: Allen Lane, 2020.

Weir, Cecil. *Civilian Assignment*. London: Methuen, 1953.

Williams, L.J. *Digest of Welsh Historical Statistics 1700–1974, Vol. 1*. Cardiff: Welsh Office, 1985.

Williams, Mari A. *A Forgotten Army, Female Munitions Workers of South Wales 1939-1945*. Cardiff: University of Wales Press, 2002.

Wren, Colin. *Industrial Subsidies, The UK Experience*. London: Macmillan, 1996.