

Multinational business, technology transfer and rearmament before the Second World War

This paper seeks to analyse the role of international business networks and technology transfer with particular reference to the question of rearmament in the years leading up to the Second World War. Business-state relations in this area are likely to be far from straightforward. In many areas information on scientific and technological developments was widely exchanged: big business, cartels, and a range of non-state actors continued to operate across national borders and under diverse political conditions throughout the interwar years and even into the war. This paper seeks to examine, therefore, aspects of the relationship between international knowledge-transmission in strategically important industrial sectors and the rearmament drive and preparations for war in both Germany and the democracies.

In several respects, the links between business and the state in such an important area appear to be tenuous. Given the state of the world economy in the 1930s, governments in the democracies were reluctant to add to the burden of constraints imposed on international trade. Similarly, there was a natural, and strong, inclination on the part of business to avoid, as far as possible, becoming entangled in international politics. American and European business elites, formed on the basis of scientific and technological collaboration between multinational enterprises, were not predisposed to focus on the implications of new ideological challenges - even when the politicisation of business life under National Socialism became obvious. It is the intention in this paper to offer a few introductory and exploratory remarks on the transactions and interactions of multinational business in the development and exploitation of key, strategic technologies as the climate in international relations deteriorated in the years leading up to the outbreak of the Second World War.

In a recent and masterly survey of global capitalism, Jeffrey Frieden is unequivocal when describing the collapse of the international order in the years between 1931 and 1945. In his view, the economic, political, social and cultural components that had defined the world before 1914 disappeared completely.¹ Certainly, if that pre-1914

order is defined largely in terms of a set of shared principles or even assumptions about how the global economy should operate, the force of Frieden's argument is undeniable: the values that were almost universally held before the First World War were obliterated by the economic nationalism of the 1930's. The delicate and self-regulating machinery of the international economy was rapidly jettisoned by national governments in favour of a variety of bilateral and multilateral trade and payments agreements.

This sudden rupture to established patterns of international economic relations did nothing to assist policy-makers in the democracies as they struggled to understand, or perhaps even identify, the nature and significance of new ideological challenges – especially the totalitarianism of National Socialism. Moreover, one of the most intriguing aspects of this failure to grasp a clear picture of the threat-capabilities of potential enemy powers is just how poorly informed Britain, the US and France were over how economically or militarily prepared Germany was to fight total war. Rather, as the decade progressed, policy formulation seemed to depend on partially accurate information at best and erroneous assumptions at worst. As David Dilks has commented, initially the British government believed, on the advice of relevant analysts, that rearmament in Germany would be constrained by economic weakness – just as it was in Britain. Very worryingly, it was discovered, too late, that this did not seem to be the case. Thereafter, ministers and officials 'were apprehensive lest the worsening of Germany's economic situation, of which they received constant reports, should provide the reason, or pretext, for aggression.'² Similarly, John Cornwell has pointed to how a high level of co-operation between civilian and military elites in Britain facilitated the secret development of innovative intelligence-gathering technology and techniques – radar and code-breaking – that helped the nation to stave off defeat. But, by way of contrast, Cornwell claims that the intelligence agencies themselves had a very limited notion of what German weapons technology had achieved in the pre-war era.³ However, one of the purposes of this paper to begin to question whether this knowledge gap was quite as extensive as historians have assumed. From the mid-1930s, for example, the RAF developed radio-beam approach systems based on technology acquired by Standard Telephones and Cables under licence from Lorenz AG and Telefunken, and used by Lufthansa.

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Undoubtedly, mistakes were made over the interpretation of the information that came out of Germany. But it does not necessarily follow that those mistakes arose because of a paucity of information on scientific and technological developments in general. As a number of studies have shown in recent years, a range of non-state actors continued to operate across national borders throughout the interwar years and into the war.

Although the level of their lending activities was drastically curtailed after 1931, bankers, for example, continued to be involved in international finance just as they had before 1914. Indeed, for the central bankers who met at the Bank for International Settlements in Basle, the international financial crisis underlined the need, as they saw it, for continuing, close co-operation. Similarly, the tide of economic nationalism did not stop the advance of multinational enterprise or bring to an end foreign direct investment. In recent years, a number of important studies of big business operating under various political conditions have been published; as a result, the relationship between states, enterprise and everyday life has become much clearer.⁴

In the interwar world, economic nationalism was expressed in its most extreme form in the communist and fascist regimes. Surprisingly little attention, however, seems to have been paid by historians to the phenomenon of technology transfer between the democracies and dictatorships in the 1930s. In the early 1970s, Antony Sutton produced a multi-volume study of western technology and Soviet economic development. He made the intriguing observation that, in the 1920s, technology transfer was recognised as an important mechanism for development; it was then heavily downgraded by economic historians and almost completely forgotten in the period after 1930. Sutton wryly commented that his data was largely drawn from State Department files – which amply documented the massive involvement of US firms in the Soviet Union – in order to establish a thesis that seemingly had been rejected by the State Department itself.⁵ Although most of the involvement took place up to 1932, a second phase of planning and construction of major plants by western companies occurred between 1936 and 1940. Throughout the period, Sutton concludes, transfers of technology to the Soviet Union were made not only with the acquiescence of western governments but also with their approval and often encouragement.⁶

If this was the policy that democratic governments followed, albeit implicitly, in relations with a major communist power that was manifestly hostile in ideological

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terms, what was the position with regard to the Third Reich? At first sight, it could be argued that the level of scientific and technical attainment in Germany was at least equal to that of Britain and not far behind that achieved in the US. Indeed, among those firms supplying machinery to the Soviet Union – especially power engineering equipment for large construction projects - was Siemens, the German multinational.⁷ Yet, the significance of technology transfer between even industrially advanced states should not be overlooked. One historian, von Tunzelmann, has pointed to the distinction that should be made between ‘process’ and ‘product’: process efficiency, achieved by means of time-saving innovations for example, appeared to be lacking in the German economy before 1945. Technicians and engineers might have played a considerable part in the manufacturing system, but there seemed to be a tendency to focus on technical aspects of engineering rather than production engineering.⁸ Products and processes directly related to rearmament were, naturally enough, closely guarded secrets on grounds of national security. But there were areas of technology that were held, in both Britain and Germany, to be of considerable military importance, because of their strategic significance; questions involving the transfer of the technology brought governmental circles into contact with industrialists in both countries.

In the twentieth century, ready and continuing access to vital raw materials became necessary if a state was to develop and build up its armaments and, moreover, fight a war of any duration and expect to survive. The requirements of modern industrialised warfare dictated that, in addition to the demands of armed forces in the field, domestic armament industries had also to be continuously supplied with essential raw materials like minerals and metals. At the same time, civilian populations had to be adequately fed and clothed if morale on the home front was not to be undermined. One of the lessons graphically demonstrated by what contemporaries called the Great War was that the growing shortage of resources suffered by Germany was of crucial significance in dictating the outcome of the conflict. Only the US was able to command the economic strength to maintain supplies during such a prolonged conflict; the European powers, individually or in coalition, suffered severe shortages and disruption. It was quite clear that the security of supply of raw materials before and during ‘total’ war had now to be considered a key strategic objective: any belligerent that depended on imports - whether delivered over land or by sea - would be perilously exposed, if not fatally weakened. In

this context, a whole range of goods and products assumed some kind of strategic importance as potential or actual war materiél.

Although the productive potential of the German economy remained very considerable after 1918, Germany's ability to exercise control over raw materials – hardly impressive before 1914 - deteriorated significantly under the impact of the Versailles Treaty. From 1938, the Third Reich was able to plunder the resources of its neighbours first through territorial aggrandisement and then by conquest. Yet, in planning to launch his wars of annihilation, Hitler was determined that the German economy would be organised to ensure a sufficient supply of both guns and butter. In this respect, as Richard Overy has recently pointed out, state intervention under Hitler was qualitatively different from other managed economies of the twentieth century.⁹ As war grew ever closer, national economies were increasingly directed to serve the needs of rearmament. With the transition to *Wehrwirtschaft* underway by the mid-1930s, the German economy, however, was increasingly directed to both weapons production and the construction of key parts of infrastructure. Integral to the war preparations was the drive to achieve autarky: self-sufficiency in raw materials allowed scarce foreign-exchange resources to be reallocated. The development of domestic industrial products, which could act as a substitute for imported goods, was subsidized even when the latter were cheaper than the former.¹⁰ For, in cases where the domestic resource-base was deficient, the intention was to exploit technological advances in the production of synthetic raw materials and thereby enhance the capacity for self-sufficiency.

From the 1920s, several oil and chemical corporations had experimented with hydrogenation processes - the chemical addition of hydrogen to act as a catalyst - and three important products had been manufactured: margarine, ammonia and synthetic motor fuel. There was a great interest in how the development of these processes might open up new and cheaper ways to produce synthetic, or ersatz, versions of existing products or possibly even entirely new products. The hydrogenation of coal, for example, seemed to offer the potential not just for the production of fuels but also for by-products of use to the chemical industry.¹¹ Germany led the world in the development of the two catalytic processes employed: hydrogenation involving very high temperatures and pressure and, subsequently, the so-called Fischer-Tropsch process that used carbon monoxide. In the history of research and development, as

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David Edgerton has recently written, coal hydrogenation should occupy a very important place: it was the biggest single project of the world's greatest chemical firms in the interwar years – IG Farbenindustrie and Imperial Chemical Industries (ICI).¹²

In many cases, collaboration between companies over investigating the technical and scientific processes involved, and in sharing the development costs, was a first and necessary step before the potential for commercial exploitation could be explored. But the results proved to be very disappointing. By the 1930s – a decade when commodity prices were depressed – the costs of producing synthetic materials were considerably higher than the costs involved in using raw materials in conventional processes. Yet, once Hitler came to power in Germany, such economic factors counted for nothing in comparison to geo-strategic considerations. Many of the great technological developments of the twentieth century thus became key tools of militarism and autarky. For the production of oil from coal, and also the manufacture of synthetic rubber and fibres, would not have survived commercially if required to be competitive in a global free market. It is a curious irony, therefore, that this drive for autarky embraced an international dimension. As Edgerton suggests, practical technological nationalism in the twentieth century has had a contradictory effect: it has encouraged the movement of technologies across political boundaries.¹³

A principal vehicle for transactions in emerging technologies was the multinational triumvirate of IG Farben, ICI and the giant US chemical corporation, Du Pont. Close personal relationships and technical collaboration developed in the 1920s and were maintained until interrupted by war. In late November 1938, Lord McGowan, President of ICI, wrote to his friend, Walter Carpenter, a Director and soon to be president of Du Pont, to describe a recent visit to Germany. McGowan had been a guest at the Nuremburg rally and had been shown around an IG factory making plastics and celluloid articles. McGowan declared himself to be apolitical and impressed only with the economic progress made by Germany under National Socialism.¹⁴ In replying, Carpenter informed McGowan that a delegation from IG, including Dr ter Meer, had recently visited Du Pont in order to discuss Nylon. Carpenter considered that the prospects were fairly bright and was hopeful that an agreement with IG could be established.¹⁵

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The National Socialist elite regarded the industrial holdings of foreign-owned firms as potentially playing a part in the pursuit of autarkic objectives. Multinational enterprise, in particular, had considerable technical expertise at its disposal and, in some cases, foreign firms had considerable manufacturing capacity inside Germany. Firms could be cajoled, therefore, into contributing to Germany's industrial reorganisation. Keppler, Hitler's economic adviser based in the Reich Chancellery, was given the responsibility (before Göring took over) for organising the development of substitutes for imported raw materials. The highest priority was given to the manufacture of synthetic petrol. Initially, this was deemed to be a secret and a matter of national security. The Wehrmacht wanted to limit all future transfers of intelligence and technical knowledge. However, IG Farben successfully resisted this, at least until 1937, by arguing that technical knowledge coming from competitors was equally valuable; the German firm entered into arrangements with Standard Oil, for example, that required the conveyance of several patents to two jointly-owned companies.¹⁶

In response to prompting by Keppler, representatives of Wintershall AG - the German chemicals manufacturer - met Heinrich Schicht, President of Sunlicht AG in the Hotel Esplanade in Berlin in January 1936. Sunlicht's parent was Unilever, the giant Anglo-Dutch multinational and the proposal under discussion was that Unilever should extend a long-term loan to finance Wintershall in the construction and operation of a petrol-from-coal plant.¹⁷ Plans were drawn up for the joint venture involving, as a first step, the construction of a new hydrogenation plant. The original intention was to work to a capacity of 50,000 tons; this was revised upwards to 75,000 tons at the wish of the German government. Unilever estimated that this would involve the company in committing up to Rm6.5 million - a significant sum that included assumptions about eventual losses.¹⁸

However, when Wintershall and Unilever executives met in the middle of 1936 it became apparent that the two companies were beginning to lose control over events. Keppler had proposed that the original planned capacity of the plant be doubled straight away (to 100,000 tons). The way in which the speed of the building work was influenced by such political pressures rather than by commercial logic greatly worried

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Unilever.¹⁹ Nevertheless, through its connection with the German company, opportunities opened up for Unilever to exploit synthetic fatty acids derived from hydrocarbons. A small amount (eight per cent) of the total yield of synthetic petrol consisted necessarily of paraffin oils; this by-product could, in turn, be used to make synthetic acids for the production of soap. The German firms Henkel, Imhausen and IG Farben were all interested in the concept. Indeed, samples of different types of soap made in this way were said to exist. But as part of its agreement with Wintershall, Unilever believed that it could probably secure the whole of the German firm's soap oils production and wanted, therefore, to set up a laboratory in Berlin to investigate the process.²⁰

While the capacity for synthetic fuel production in Germany increased markedly in the years before the war, it seems that the quality of some of the ersatz spin-off products left a lot to be desired. At the end of 1938, Paul Rykens reported to his fellow directors that the German government wanted Unilever to invest Rm5 million in a synthetic acid business. Unilever had received a sample from IG Farbenindustrie; this had been tested at Port Sunlight – Unilever's UK manufacturing centre – and had given disappointing results. It was agreed that it would be some time before the product was right. It is not clear what the British government knew about any of these developments, or what unofficial channels might have existed for conveying the information.

However, there was another British multinational involved in the synthetic petrol question that counted the British state as its majority shareholder and government appointees among its board of directors: the Anglo-Iranian Oil Company. Indeed, AIOC, through Olex - its subsidiary in Germany – acted as a kind of proxy for the intelligence services. The other oil majors that were heavily involved in supplying the German market were Royal Dutch Shell and Standard Oil of New Jersey; both they and AIOC obviously had no interest in seeing Germany turn aside completely from importing mineral oil and, consequently, considered it diplomatic to co-operate to varying degrees with projects to develop synthetic products.²¹

In March 1936, Sir John Cadman, AIOC's chairman, wrote to Sir Frank Smith at the Department of Scientific and Industrial Research - one of the more *recherché* parts of the governmental machine. However, notwithstanding the obscurity, the work that this

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Department engaged in is just one example of how, from this point onwards, Britain began to build the administrative means to wage economic warfare when required to do so. Cadman provided Smith with information and a sample of synthetic oil for the Department's Special Lubricating Oil Committee to analyse. In reminding Smith that the source of the information should be kept secret, the AIOC chairman commented, perhaps unnecessarily but nonetheless revealingly, 'it is possible sometimes for information to be secured from commercial sources which are not open to Governmental Departments'. A few days later, Cadman backed this up by telling Sir Horace Wilson, Chief Industrial Adviser and one of the most influential figures in Whitehall, that he thought it safe to say that 'a definite scientific advance has been made which may lead to very important results'.²²

The advance in question seems to have related to the Fischer-Tropsch process. At this stage, the Anglo-Iranian believed that the technology was likely to become more important than the hydrogenation process because the production costs were likely to be lower – or lower, at least, than the costs of manufacturing at ICI's plant at Billingham in the UK. AIOC noted that production based on Fischer-Tropsch process was being expanded in Germany, that the technology was being operated under licence in France, and that there was considerable activity among colliery owners and other parties in the UK. Those included, the Anglo-Iranian observed, certain government departments which were likely to be interested in seeing something done, not only to assist the coal industry, but also to give a measure of protection from the point of view of 'national safety'.²³

By August 1936, Wilson was able to inform Cadman that ICI had not been antagonistic when news of the developments had been reported to them. Rather, they agreed that both processes should be tried out, the one being complementary to the other.²⁴ In the light of this, WH Cadman, the brother of AIOC's chairman, was despatched to Germany accompanied by Miles Reid, of Powell Duffryn Associated Collieries Ltd. The purpose was to undertake a fact-finding visit to Ruhrchemie AG - a firm in which Krupps, Mannesmann and Gutehoffnungshutte were all major shareholders. However, the British visitors were not allowed a close inspection of the synthesis plant, and the general lack of data meant that AIOC did not feel that it could reach a decision on the viability of purchasing a licence.

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The company's views, thereafter, became much firmer. The sub-committee of the Committee of Imperial Defence that was concerned with synthetic processes produced a secret memorandum written by WH Cadman. The document recorded AIOC's conclusion: there was no good case for the establishment of Fischer-Tropsch plants in the UK. Any decision on whether the establishment of such an uneconomic industry in Britain was justified, in view of what, rather euphemistically, was referred to as 'the present emergency' involved political and defence considerations.²⁵

The developments commented on in this short paper illustrate, therefore, some of the dilemmas faced by multinational enterprise and the democracies in the era of the Nazi dictatorship. In general, surprisingly few constraints were imposed on the activities of multinational business by democratic governments – a situation that the worsening climate in international affairs did little to change. Yet, if business interests were caught up in the development of industrial processes that, ultimately, facilitated Hitler's nihilistic goals, defence industries in the democracies also benefited from bilateral flows of technology. For, technology was transferred both into and out of Germany.²⁶ High-value German machinery was exported to Britain, accompanied by the engineers responsible for installing it. This was expertise and equipment that the democracies themselves needed for rearmament purposes.

It would seem reasonable to assume, therefore, that there were well-established areas of collaboration between scientific and technical experts in the western democracies and those in Nazi Germany. This certainly aided intelligence experts in Britain during the 1930s to predict - in the event accurately - that in the course of a war of any duration the Third Reich would come to depend on an expanded production of synthetic fuels. As Germany's dependence on oil imports was common knowledge and British strategy was designed around the imposition, during any war, of an effective naval blockade, it might be said that to make such a prediction was to state the obvious.

Nevertheless, it is clear that throughout the 1930s business networks of one kind or another comprised an important element of the international economy, just as they had always done. If there were intelligence failures in areas that were vital for the safeguarding of national security, it seems likely that the causes lie in failures of

understanding and interpretation rather than in a lack of objective information. The structure of the global economic order might have collapsed but the established networks of those who participated in the international economy remained largely intact.

Abbreviated Endnotes

¹ Jeffrey A. Frieden, *Global Capitalism: Its Fall and Rise in the Twentieth Century* (W. W. Norton & Co., NY, 2006), p. xvi.

² David Dilks, 'Britain and Germany, 1937-1939: A Context for British Reactions to the German Resistance', in Adolf M. Birke, Magnus Brechtken & Alaric Searle (eds), *An Anglo-German Dialogue: the Munich Lectures on the History of International Relations* (K. G. Saur, München, 2000), p. 165.

³ John Cornwell, *Hitler's Scientists: Science, War and the Devil's Pact* (Viking, London, 2003), p. 267.

⁴ See, for example, Lukas Straumann and Daniel Wildmann, *Schweitzer Chemieunternehmen im "Dritten Reich": Herausgegeben von der Unabhängigen Expertenkommission Schweiz – Zweiter Weltkrieg, Band 7* (Zurich: Chronos Verlag, 2001); Henry Ashby Turner, *General Motors and the Nazis: The Struggle for Control of Opel, Europe's Biggest Carmaker* (London: Yale University Press, 2005).

⁵ Antony C. Sutton, *Western Technology and Soviet Economic Development, Vol. II: 1930 to 1945*, (Hoover Institution Press, Stanford, 1971), p. 5

⁶ *Ibid.*, p. 263.

⁷ For background see, Wilfried Feldenkirchen, 'Siemens in Eastern Europe: From the End of World War I to the End of World War II' in Christopher Kobrak & Per Hansen (eds), *European Business, Dictatorship, and Political Risk 1920-1945* (Berghahn Books, NY, 2004).

⁸ Nick von Tunzelmann, 'The transfer of process technologies in comparative perspective', in Charles Feinstein & Christopher Howe (eds), *Chinese Technology Transfer in the 1990s: Current Experience, Historical Problems and International Perspectives* (Edward Elgar, Cheltenham, 1997), p. 215.

⁹ Richard J. Overy, 'German business and the Nazi New Order' in Terry Gourvish (ed.), *Business and Politics in Europe, 1900-1970* (2003).

¹⁰ Dan P. Silverman, *Hitler's Economy: Nazi Work Creation Programmes, 1933-1936* (1998).

¹¹ Raymond G. Stokes in Werner Abelshauser (et al), *German Industry and Global Enterprise. BASF: the History of a Company* (2004).

¹² David Edgerton, *The Shock of the Old: Technology and Global History since 1900* (Profile Books Ltd, London, 2006), p. 122.

¹³ *Ibid.*, p. 117.

¹⁴ HML, Carpenter Papers, 542, Box 820, C-13, McGowan to Carpenter, 21 Nov. 1938.

¹⁵ *Ibid.*, Carpenter to McGowan, 12 Dec. 1938.

¹⁶ Declan O'Reilly, 'IG Farbenindustrie A.G., Interhandel and General Aniline & Film Corporation' (Ph.D., University of Cambridge, 1997), p.159.

¹⁷ UARM, SD 1887, memo by Sunlicht (Berlin), 16 Jan. 1936.

¹⁸ UARM, Special Committee with Continental Committee, minutes of meetings, G115 (undated, Sept. or Oct. 1937).

¹⁹ UARM, SD 2062, letter, Heinrich Schicht (Berlin) to Special Committee (London), and memo, 11 June 1936.

²⁰ UARM SD 2341, letter, Heinrich Schicht (Berlin) to Ballantyne (London), 6 Jan. 1937.

²¹ For background see, Rainer Karlsch & Raymond G. Stokes, '*Faktor Öl*': *Die Mineralölwirtschaft in Deutschland 1859-1974* (München, C.H. Beck, 2003).

²² BP, 72488, letters, Cadman to Smith, 23 March 1936, and Cadman to Wilson, 27 March 1936.

²³ *Ibid.*, note (undated) for the Chairman.

²⁴ *Ibid.*, letter, Wilson to Cadman, 11 August 1936

²⁵ Ibid., memo (undated, but see also letter by FC Starling, 26 May 1937, inviting Cadman to attend the sub-committee meeting).

²⁶ See, Feldenkirchen, 'Siemens in Eastern Europe' , p. 134, for the comment that declining volumes of Soviet orders in the course of the 1930s was partly because Siemens was increasingly shifting orders to Britain and the US.