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## LORRAINE AND THE RUHR

*N. J. G. Pounds*

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THE existence within 150 miles of each other of one of the richest of Europe's coal fields and the most extensive of her iron ore fields must tempt speculation on their mutual relationship. It has been stated not infrequently that they belong naturally each to the other, and this supposition has led to vague generalizations upon the economic unity of Lorraine and the Ruhr.<sup>1</sup> It might seem that the Ruhr and Lorraine would have supplemented each other's deficiencies in coal and iron ore. There have, it is true, been tendencies towards such an exchange of materials, but always strong forces—political, commercial, and, above all, technological—have worked to break up such an economic union. A system of exchange as simple and as complete as, for example, that which unites the industrial area of the southern Urals with the Kusbas has never at any time existed between Lorraine and the Ruhr. It is the purpose of this paper to examine the extent to which, at various times, the Ruhr

and Lorraine have in fact each supplied the needs of the other, and describe the commercial patterns that have existed between them.

Iron working is of a considerable antiquity in both Lorraine and the Ruhr. Iron smelting began in the latter in the early years of the 18th century, when bog ore, dredged from the marshes of Westphalia, was smelted with charcoal from the local forests. As the supply of bog ore grew smaller, it was supplemented and then replaced by the ores from the Siegerland. It was not, however, until 1849 that coke, prepared from the vast local reserves of coal, was first used successfully to smelt the ore. The impetus which this gave to the iron industry quickly exhausted the supplies of bog ore. A coal measures iron ore, obtained from the local mines and supplemented by richer ores from the Siegerland, replaced the bog ore, and was smelted in the 1850's and 60's in an increasing number of furnaces. Some ores, suitable for the Bessemer process, were imported from Spain, Italy, and elsewhere, but to most observers in the middle years of the century there seemed as little likelihood of a shortage of iron ore in northwestern Germany as there was of a lack of coal.

There was no reason why the Ruhr industrialists should require ore from Lorraine at this time, nor was there any

<sup>1</sup>Statements of this kind in textbooks are legion. On a higher plane W. E. Ogburn and W. Jaffe: *The Economic Development of Post-War France*, Columbia University Press, 1929, p. 31, states: "A natural system of exchange was . . . set up between Lorraine, sending out iron ore and pig iron, and Westphalia sending in return coal and coke. . . . The new . . . Franco-German frontier ran, however, right across and intercepted the trade routes taken by Lorraine iron going to the Ruhr and by Westphalian coal and coke consigned to Lorraine."

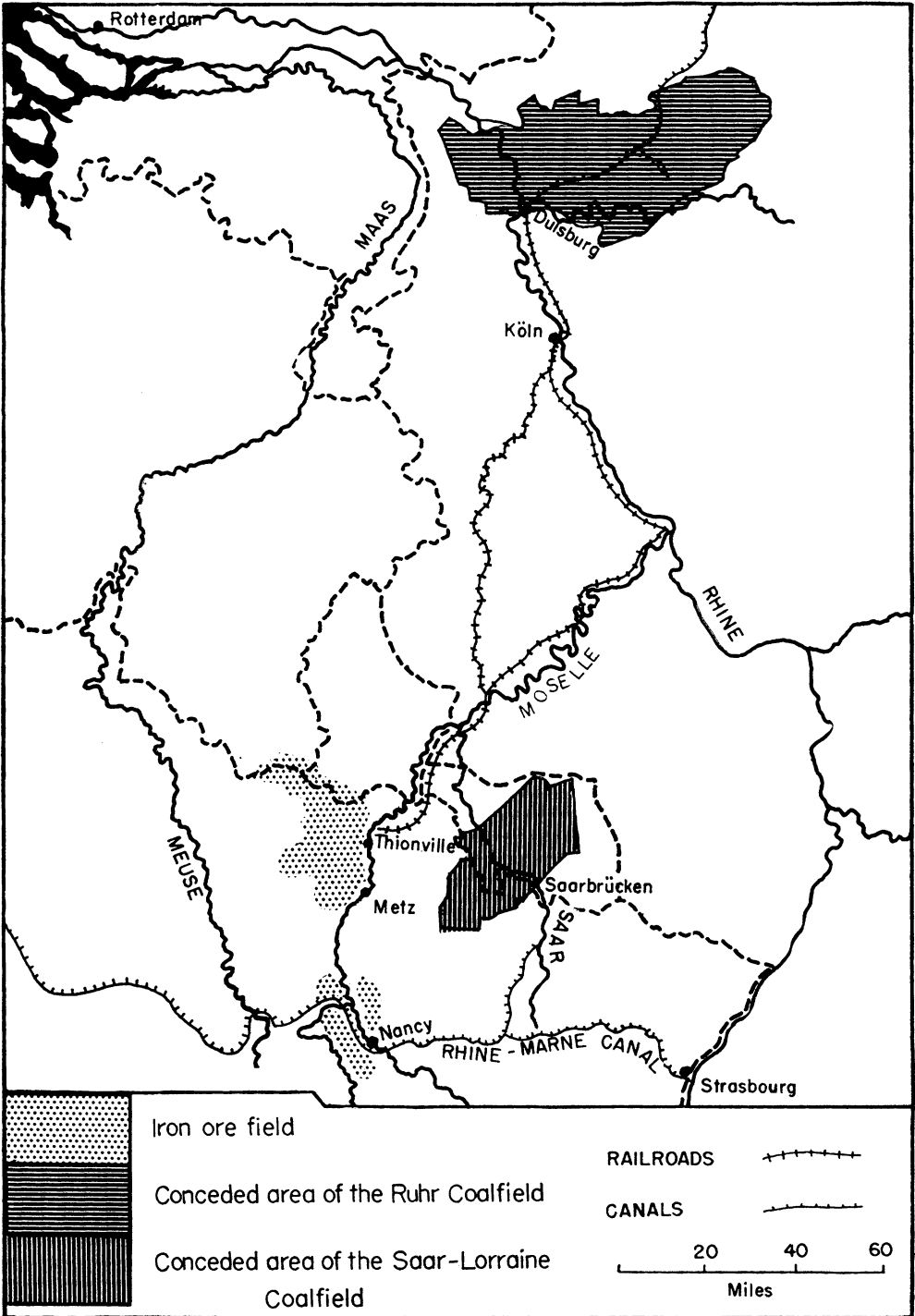


FIG. 1. Coal and iron ore in the Rhineland, Lorraine, Luxembourg, and the Saar.

demand in Lorraine for fuel from the Ruhr.

The iron industry of Lorraine was older by many centuries than that of the Ruhr, and like that of the Ruhr depended at first entirely upon local resources.<sup>2</sup> Iron ore deposits were scattered through Lorraine and the surrounding provinces. Within the area which now comprises industrial Lorraine and Luxembourg the ore was of two distinct types. Today the more familiar is that which has earned for itself the contemptuous epithet of *minette*. It is a low-grade, phosphoric ore, occurring in a series of beds in the upper Lias. But a century ago the more important might well have been thought to be the *fer fort*, an ore belonging to a residual deposit scattered over parts of the limestone plateau of Lorraine.<sup>3</sup> It occurred in small, irregular patches, was mined in bell pits, and yielded a tough iron in contrast with the brittle metal obtained by refining the pig iron obtained from the *minette*.

In retrospect it seemed as if Bismarck's annexation of part of Lorraine in 1871 was inspired by a desire to possess all the reserves of *minette* then known. Hartshorne has demonstrated<sup>4</sup> that the political boundary adopted in the Treaty of Frankfort of 1871 accorded closely with the strategic and linguistic aspirations of the Germans. There is no reason to suppose that the *minette* deposits were particularly attractive to

the Prussian Chancellor, but the debates in the French Chamber, then sitting at Bordeaux, on the ratification of the German treaty, make it clear that in some quarters the objective of German policy was believed to be the annexation of the Lorraine ore deposits to meet the growing needs of German industry.<sup>5</sup>

The *minette* yielded a pig iron which, from its high phosphorus content, was particularly fluid, and eminently suited to foundry work. Most of the works which used *minette* were at this time engaged chiefly in making castings. Refined on the hearth, the phosphoric pig could be made to yield a poor wrought iron which found an outlet amongst the nail-makers. If great care were exercised, it could be puddled, but the iron that resulted was useless for steel making and of no high value for much else. The advent of Bessemer's and then of Pierre Martin's methods of steel making had the effect of diminishing, relatively if not absolutely, the value of Lorraine ore, which had no value at all for these processes. Thus, at the time of its annexation by Germany, the *minette* was sinking in the esteem of the iron masters and its importance was, relatively at least, in decline.

#### GERMANY ANNEXES THE ORE-FIELD (1871-1880)

The Treaty of Frankfort of 1871 and the German annexation of most of the ore field opens a second period in the relations between Lorraine and the Ruhr. Only the ore deposits near Longwy and around Nancy remained

<sup>5</sup> *Recueil des Traités, Conventions, Lois, Décrets et autres Actes relatifs à la Paix avec l'Allemagne*, Paris, Imprimerie Nationale, 1872; the text of the debate on this issue is on pages 93-137; Jules Favre, *Gouvernement de la Défense Nationale*, Paris, 1871-75, Vol. 3, p. 372.

<sup>2</sup> G. Hottenger: *L'Ancienne Industrie du Fer en Lorraine*, Nancy, n.d.; A. Weyhmann: "Geschichte der älteren lothringischen Eisen-Industrie," *Jahrbuch der Gesellschaft für lothringische geschichte und Altertumskunde*, Vol. 17, 1905, pp. 1-210.

<sup>3</sup> E. Jacquot: "Mémoire sur les mines et les minières de fer de la partie occidentale du département de la Moselle," *Annales des Mines*, 4e série, Vol. 16, 1849, pp. 427-494; J. Bichelonne and P. Angot: *Le Bassin Ferrifère de Lorraine*, Nancy, 1939, p. 20 et seq.

<sup>4</sup> Richard Hartshorne: "The Franco-German Boundary of 1871," *World Politics*, Vol. 2, 1950, pp. 209-250.

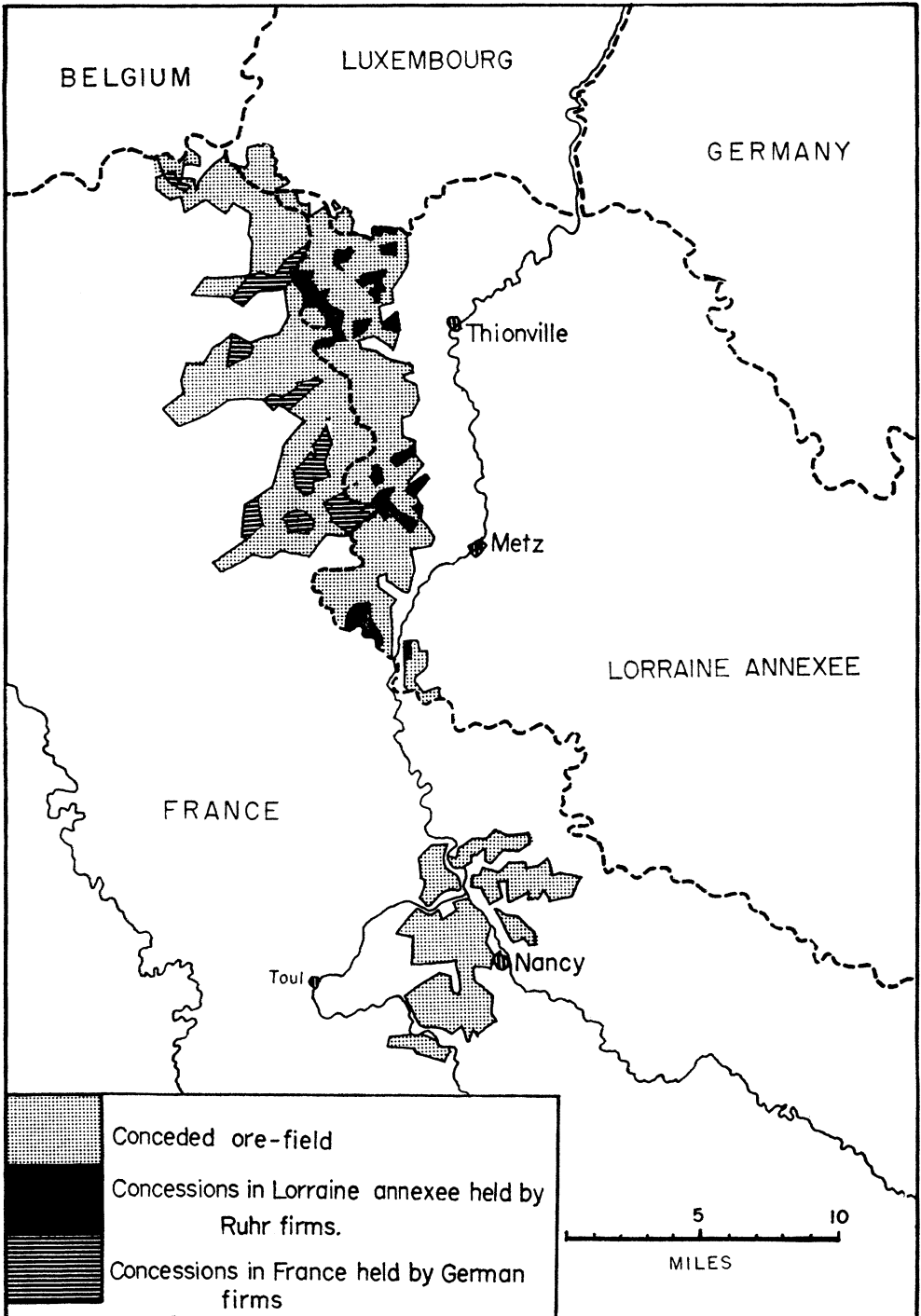


FIG. 2. Conceded ore field of Lorraine and Luxembourg, about 1910.

in French hands.<sup>6</sup> The Briey basin, which continued westward into France, had not yet been discovered, and its development was to wait for over 20 years. Germany took about 80 per cent of the conceded ore field of Lorraine and about 75 per cent of its small pig-iron producing capacity. At the same time, Luxembourg was in customs union with the German Empire, and German industry had unrestricted access to almost the whole minette field.

For a decade the German industrialists made no attempt to weld Lorraine and the Ruhr into a single economic unit. The Ruhr manifested no desire for the low-grade minette; the fuel required in the minette field was in fact largely supplied from the Saar, Belgium, and Northern France, with only a small contribution from the Ruhr, and much of this period was one of economic stringency, when falling prices offered little inducement to expansion or experiment.

If a close commercial link existed at this time between Lorraine and any other industrial area, it was in fact with the Saar basin. This was [the nearest source of coal to the minette field and, though its coke was soft and friable, it could be used in small furnaces. De Wendel, who operated iron works in Lorraine, went so far as to build blast furnaces at Stiring, close to Saarbrücken, which he supplied with coal from the Saar and ore from his ore fields in Lorraine. For a few years de Wendel operated a shuttle service between Lorraine and the Saar, coal moving in one direction and iron ore in the other.

Coal and iron ore moved between the Saar and Lorraine also by barges on the rivers Saar and Moselle. Thionville

<sup>6</sup> "Influence de la Cession de l'Alsace-Lorraine à l'Allemagne sur l'Industrie métallurgique," *Revue Universelle des Mines*, Vol. 29, 1871 pp. 241-250.

and Metz grew to be important river ports, and after 1866 the *Canal des Houillères* and the Rhine-Marne Canal also joined in carrying fuel and ore between the Saar coal fields and the Lorraine iron ore field.

But there was no similar development between Lorraine and the Ruhr area. The minutes of the evidence furnished to the *Reichs Kommission*, appointed in 1878, to inquire into the German iron industry,<sup>7</sup> suggest that except for a small consumption in Lorraine of Ruhr coal, the two industrial regions were economically poles apart.

#### THE COMING OF THE BASIC PROCESS (1880-1890)

The year after the German Government's inquiry saw the patenting of the Gilchrist-Thomas, or basic process, for the manufacture of steel. It had come at an opportune moment for Germany. There was by now some anxiety among German iron masters for the future of their ore supply. The coal measures ore was nearing exhaustion, and the high grade ores of Spain, Elba and central Sweden were available only in small quantities. But the effect of the Gilchrist-Thomas invention was to give a new value and importance to those highly phosphoric ores which had proved unsuitable for the Bessemer process. Germany was rich in phosphoric ores, both in Lorraine and in many parts of the Northern Plain, and the new invention was eagerly adopted.

In 1879 two Ruhr concerns simultaneously blew their first basic charges, and in 1881 the first charge was blown on French soil at the Mont Saint-Martin works, near Longwy.<sup>8</sup> There is

<sup>7</sup> *Protokolle über die Vernehmungen der Sachverständigen durch die Eisen-Enquete-Kommission*, 1878.

<sup>8</sup> Donald C. McKay: "The Pre-War Development of Briey Iron Ores," in *Essays in the History of Modern Europe*, edited by D. C. McKay, New York, 1936, pp. 168-184.

reason to suppose that the West German iron masters thought at first in terms of using the bedded phosphoric ores of Lower Saxony, but these were soon supplemented or replaced by ore from Lorraine. For a short period, beginning in the 1880's, the minette ore field not only supplied considerable quantities of ore to the Ruhr but constituted its largest single source of supply. At the same time Ruhr coal began to assume a relatively large role in the Lorraine smelting industry. The Saar coal was proving, as had been suggested in the minutes of evidence of the 1878 commission, unsuitable for large furnaces, and Ruhr coal and coke were in increasing demand.

Of the three practicable routes between Lorraine and the Ruhr none recommended itself as particularly convenient. The rivers Moselle and Rhine provided jointly a water route of about 290 miles from Thionville to Ruhrort. The Rhine from Koblenz to the destination presented no difficulties but the Moselle itself was shallow and meandering and unsuitable for any except small boats of slight draft. It was in fact used very little for barge traffic. The alternative water route was by the Rhine-Marne Canal to Strasbourg and thence by the Rhine to Ruhrort, a distance of about 450 miles. This route was used more than the Moselle, but it necessitated a break of bulk at Strasbourg.

The third mode of transportation was by rail—either the Moselle valley line or the route across the Eifel. Both were used, though the former became the more important. It would seem logical for the same freight cars to carry ore in one direction and coal or coke in the other. This indeed happened, but, if one may judge from the complaints in the trade periodicals, the system did not work as smoothly and as efficiently as might have been supposed. So much

time was wasted switching the cars from the blast furnaces where they had discharged their ore to the mines where they were to load with coal, that it was more economical to send them back empty to Lorraine and use other cars for the coke. With the introduction of cars with high steel mesh sides for the coke, this incipient shuttle service came to an end.

Because of the political division of the ore field and the fact that much of the movement was within the German Empire, it is not easy to form an estimate of the volume of the exchange of ore and coal. It would perhaps be not incorrect to suggest that the Ruhr supplied at least half of the total fuel demand of the minette field as a whole, and was itself supplied from this source with no more than twenty per cent of its ore. The direct interchange of fuel and ore between the Ruhr and Lorraine never achieved a greater importance than it possessed in the late '80's and early '90's of the last century.

#### GROWTH OF INDUSTRY IN LORRAINE

A fourth period in the history of the development of relations between Lorraine and the Ruhr occupies the last decade of the 19th Century and the years leading up to the First World War.<sup>9</sup> It was characterized by yet another change in their relationship. Technical improvements in the design and operation of blast furnaces were reducing the consumption of fuel, and the point was reached at which to obtain one ton of pig iron at Ruhrort from minette necessitated a transport of, at a rough computation, 645 ton-miles, whereas to obtain the same amount of pig iron in Lorraine necessitated a transport of only about 200 ton-miles. It should be

<sup>9</sup> E. Gréau: *Le Fer en Lorraine*, Chambre de Commerce de Neurthe-et-Moselle, Nancy, 1908; A. Somme: *La Lorraine Métallurgique*, Paris, 1930.

added, however, that the distribution of iron products from Lorraine was more costly than from the Ruhr.

Under these circumstances the German concerns acquired ore concessions in Lorraine and built blast furnaces as close as was practicable to the ore. Their smelting operations were confined to Luxembourg and German-occupied Lorraine, but they took ore concessions in the part of Lorraine which remained French after 1871.<sup>10</sup> The Gelsenkirchen concern, after merging with the owners of smelting works at Esch and at Audun-le-Tiche, built in 1909 a large new works at Belval, close to the ore field. Deutsch-Luxemburg, which was controlled by Stinnes, established the Differdange furnaces, and Thyssen those at Hagondange. Gütehoffnungshütte of Oberhausen, and Phönix of Ruhrort prepared plans for the erection of smelting works on the minette field, but were anticipated by the war of 1914. Rumor credited Krupp of Essen with a similar intention.

Three out of the five major works in the Saar also built or acquired blast furnaces in Lorraine: Stumm at Uckange; Roechling at Thionville and Dillingen at Redange. Furthermore, the Saar works of Burbach and Saint-Ingbert were part, respectively, of the Luxembourg concerns of Arbed and Hadir. Most of the other leading iron and steel concerns of northwest Germany—Krupp, Rheinstahl, Hoesch, Klöckner, Hoerde, Bochum, and Dortmund—acquired ore concessions on which, if the war of 1914 had not occurred, some of them would certainly have erected smelting works.

<sup>10</sup> Louis Bruneau: *L'Allemagne en France*, Paris, 1915, pp. 32-120; *L'Alsace-Lorraine et la Frontière du Nord-Est, Travaux du Comité d'Etudes*, Paris, *Imprimerie nationale*, 1918; M. Ungeheuer: *Die industriellen Interessen Deutschlands in Frankreich vor Ausbruch des Krieges, Technik und Wirtschaft*, Vol. 9, 1916, *passim*.

The practice of heat economy made it desirable to establish steel and rolling works in the closest possible proximity to the blast furnaces. Only a very few works in Lorraine, whether French or German, remained without steel works, and these specialized in iron castings. It became the function of most of the steel works in German Lorraine and in Luxembourg to produce "semis" or half-finished goods for further fabrication in the machine shops of Germany.

The same pattern of relationships was developed, though it is irrelevant to the question in hand, by the iron and steel companies of Belgium and the rest of France. Their works located on the ore field were used to supply pig iron or crude steel to their fabricating and engineering works in Fourchambault and Liège, in Commentry and Montluçon, in Aubrives and Maubeuge.

The map, Figure 3, illustrates the links that were thus established between steel-making and steel-using concerns of other parts of Western Europe on the one hand and the ore mines and ironworks in Lorraine and Luxembourg on the other. Only such *liaisons* as were publicly announced can be represented in this way. There were other bonds with works in the minette region, such as sales agreements and holdings of stock which amounted to something less than complete control over mines and ironworks. These also, in varying degrees, assured to steel and engineering works a supply of pig iron and steel and secured to the works located on the ore-field a market for their pig iron and "semis."

The minette region, taken as a whole, was one of the greatest suppliers of pig iron and crude steel to the countries of Western Europe. On the eve of the First World War its combined pig iron output exceeded that of the Ruhr by



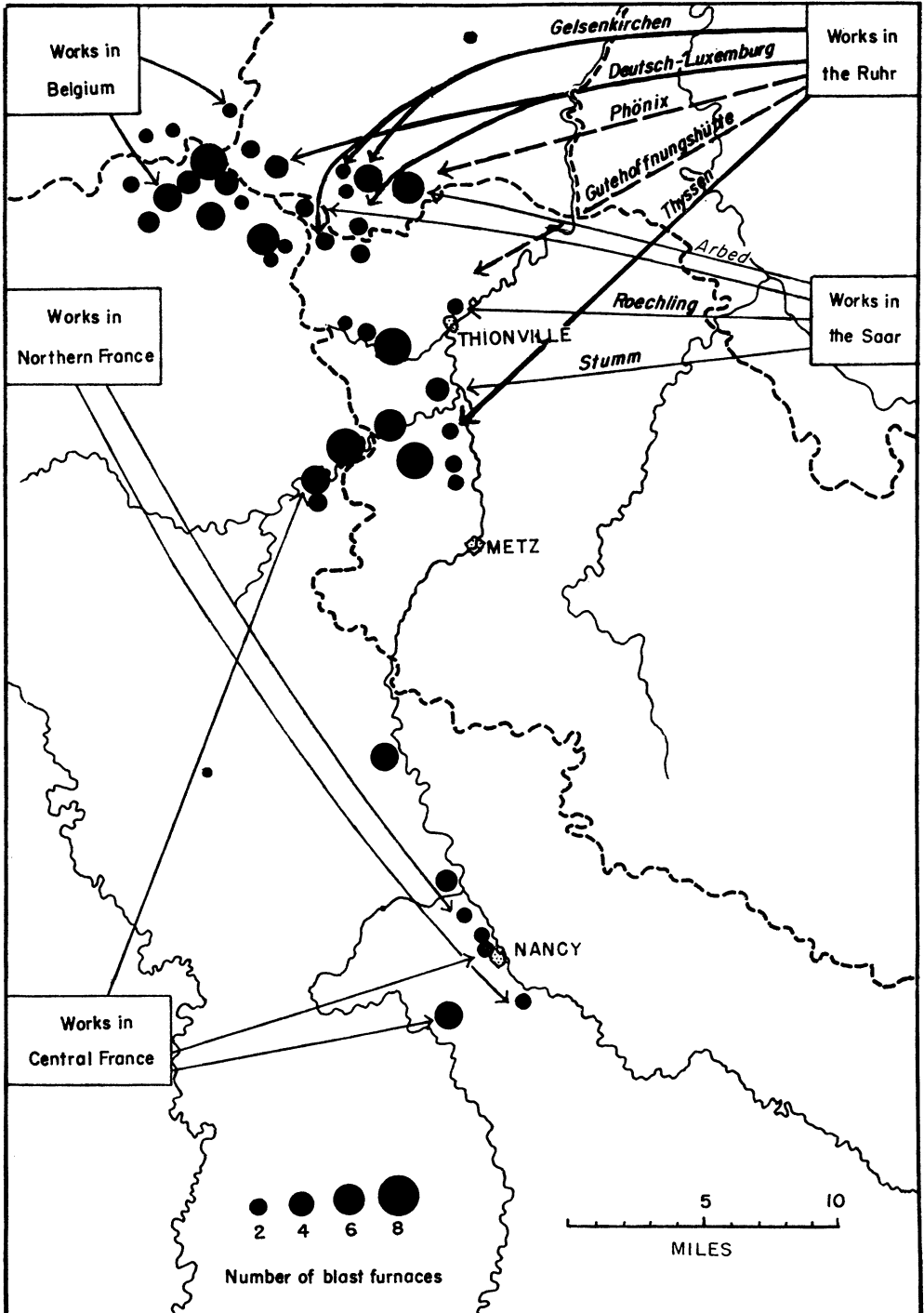


FIG. 3. Outside holdings in the iron and steel industry of the minette region, about 1910.

more than a million tons, and its steel production was two-thirds that of the Ruhr. If the biggest market for its pig iron and steel ingots, strip, and sheet was in the mills and workshops of the Ruhr, its sales to Aachen, Cologne, and the Saar, to south and Central France, and to Belgium were also large and important.

It is not easy to demonstrate the extent of the dependence of the minette area as a whole on the coal of the Ruhr. There can be little question that during these years of rapidly increasing steel production there had not been a proportionate increase in coke-oven capacity and there was a real shortage of coke. Most of the German concerns which had acquired blast furnaces and steel works in Lorraine had also bought up coal mines in the Ruhr. Their coke supply was assured, and we may assume that the coke was taken direct from the companies' coke ovens in the Ruhr to their furnaces in Lorraine or Luxembourg. The independent iron and steel works of Aumetz-Friede, at Knutange, and of de Wendel at Hayange and Moyeuvre in German Lorraine and at Jœuf in France, each bought coal mines in the Ruhr. Other Lorraine concerns entered into partnerships or agreements with Ruhr coal interests, such as the *Gelsenkirchener Bergwerks A. G.*, but there can be no doubt that the iron-works which did not actually possess their own coal mines in the Ruhr basin experienced great difficulty in obtaining enough metallurgical coke.<sup>11</sup>

As almost all the coal mining industry in the Saar was in the hands of the Prussian State, the Saar industrialists,

<sup>11</sup> G. Villain: *Le Fer, la Houille et la Métallurgie à la fin du XIX<sup>e</sup> Siècle*, Paris, 1901, pp. 61-67; *Rapport Général sur l'Industrie française, sa situation, son avenir*, Paris, Imprimerie Nationale, 1919, p. 1<sup>re</sup> partie, tome I, p. 14, where the German coal cartel is charged with discriminating against France in the sales of metallurgical coke.

Stumm and Roechling, had also bought coal mines in the Ruhr, which were used to supply their Lorraine furnaces.

The position in French Lorraine, however, was less satisfactory. Coking coal was obtainable in quantity only from the coal field of Northern France, and the supply from this source was quite inadequate for the needs of the French smelting industry.<sup>12</sup> The blast furnaces of French Lorraine—at Longwy, Homécourt, Jœuf, and Nancy—obtained their fuel where they could. The attempts of the French iron companies of Lorraine to secure control of a source of fuel make an interesting chapter in the history of the French metallurgical industry. The Ruhr coal was the most satisfactory from the metallurgical point of view and, on balance, the cheapest, but the German Coal Syndicate was generally unwilling or unable to supply the quantities asked by the French and was accused of deliberately starving them in the interests of their German rivals. France imported about half the coke needed for metallurgical purposes, and of this, during the years before the First World War, France took about a half from the Ruhr.

Thus the iron works of the minette area as a whole were dependent upon the Ruhr for the supply of fuel to the extent of about 70 per cent. The rest was obtained from Belgium and Northern France.

West Germany, in the meanwhile, had almost emancipated itself from direct dependence upon Lorraine ore. This was made possible partly by a heavy consumption of pig iron, ingot steel, and other half-finished goods from the minette area; partly by the substitution of Swedish ore for that from Lor-

<sup>12</sup> Auguste Pawlowski: *Le Développement minier et métallurgique et les Problèmes qui s'y rattachent dans l'Est français, le Luxembourg, l'Alsace-Lorraine et la Belgique*, Paris, 1913.

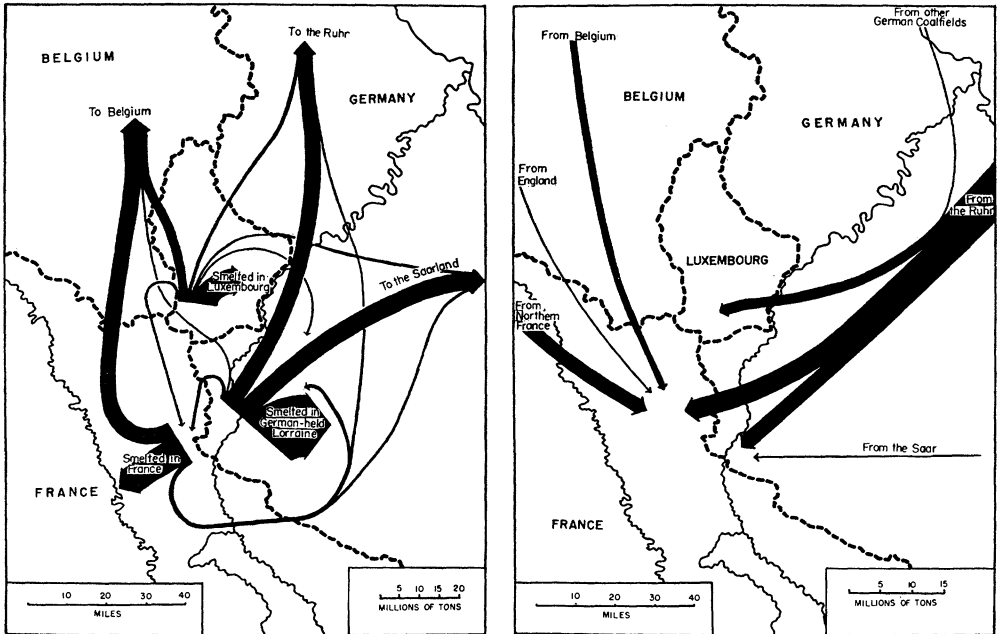


FIG. 4 (left). Movement of iron ore from the minette region of Lorraine and Luxembourg, in 1910. The use of the very small production of minette in southern Belgium is not shown.

FIG. 5 (right). Movement of coal and coke (not distinguished) to the minette region of Lorraine and Luxembourg, 1910.

rairie. The great ore deposits of Swedish Lappland had been opened up in the closing years of the 19th Century. The railway from the mines to the Baltic coast had been completed in 1888, and that to Narvik in 1902. Suitable docks already existed at Ruhrort; the Dortmund-Ems Canal was opened to traffic in 1898, and the intermediate Herne Canal was begun in 1906. As a result, Swedish ore could be delivered in the central Ruhr at a price a few *pfennig* less per ton of iron content than the minette. Add to this that the richer Swedish ores permitted a richer furnace charge and a larger output of pig iron from each furnace, gave less slag, and yielded other economies of a technical order. Henceforward, Swedish ores were to dominate the iron-smelting industry of the Ruhr.

In these circumstances, the actual movement of ore from Lorraine to the

Ruhr was quite small. The map (Fig. 4) illustrates the flow of minette in 1910. The greatest volume of exported ore went to Belgium, and the Saar took more than the Ruhr.

In 1917, the German Iron and Steel Manufacturers addressed a memorandum to the German Chancellor requesting that the incorporation of the *whole* minette area within the Reich should be made one of Germany's war aims.<sup>13</sup> This document has been taken to show that the German industrialists expected to increase their dependence on Lorraine ore and desired to strengthen their relations with Lorraine.

The industrialists certainly desired to put more territory between their works in Lorraine and the French boundary; they would have liked to

<sup>13</sup> *German Designs on French Lorraine*, The Secret Memorandum of the German Iron and Steel Manufacturers, English Translation, London, 1918.

extinguish French competition, but the real reason for their action lay in the recent action of the Swedish government in setting statutory limits to the volume of export of iron ore. The German technical and trade press reflected with what consternation this decision was received in Germany; the corresponding French press reveals a modest optimism that there might be increased sales of minette within Germany. In the event, however, the Swedish action did not lead to an increased consumption of minette in Germany.

#### THE INTER-WAR YEARS (1919-1939)

A fifth period begins with the end of the First World War, the return of German Lorraine to France, and the separation of Luxembourg from her customs union with Germany. German holdings in the minette deposits and in the iron and steel works of Lorraine and Luxembourg were expropriated and re-established as French and Belgian companies. The degree of interdependence which had existed between German Lorraine and the Ruhr was further reduced. In 1922, only 6 per cent of the pig iron produced in Germany was from minette. This proportion changed very little; in 1928 it was still about 6 per cent. It rose to at most 8 per cent, but for the years 1937 to 1940 was 1 per cent or less. Under the abnormal conditions of the Second World War, the German consumption of minette was higher because this ore could be transported with less danger and without calling upon Germany's naval resources. This unaccustomed use of minette instead of Swedish ore in the Ruhr furnaces during the war led to such an acute problem in handling the excess of blast furnace slag that, at the Friedrich-Alfred Hütte, one furnace had to be closed down.<sup>14</sup>

It is more difficult to evaluate the amount and source of coal and coke deliveries to the iron industry of Lorraine.<sup>15</sup> In 1937, coke imports into France were 3,141,000 tons, of which 2,351,000 came from Germany. The total consumption of the French smelting industry was 8,461,000 tons. If we make allowance for the use of German coal in the few coke ovens of Lorraine,<sup>16</sup> the French industry cannot have derived more than about 35 per cent of its fuel from Germany.<sup>17</sup> The position in Luxembourg is easier to evaluate: 80 per cent of its fuel was from the Ruhr; most of the remainder from Belgium.

The maps, Figures 6 and 7, show the movement of coal, coke, and iron ore between France and Germany in 1937. It can be seen that the movement of iron ore from the minette region to Germany was directed in large measure to the Saar. The iron furnaces here had been organized, for a very long time before France acquired a political ascendancy over this area, to use only minette.

<sup>14</sup> *Friedrich-Alfred-Hütte at Rheinhausen*, C.I.O.S., Vol. 24, p. 10.

<sup>15</sup> Alfred H. Brooks and Morris F. La Croix: *The Iron and Associated Industries of Lorraine, the Sarre District, Luxembourg and Belgium*, Bulletin 703, U.S. Geological Survey, Washington, 1920, p. 26, suggests that the predominance of Ruhr coal in the Lorraine industry was due to German political control over much of the area. This conclusion is not borne out by subsequent developments. The inadequacy of French coke production is stressed in R. Jordan, *The French Iron and Steel Industry*, London and Cambridge Economic Service, Special Memorandum 20, 1926, 4 *et seq.* Raoul du Fou: *Le Mouvement de Concentration dans la Sidérurgie Lorraine*, Paris, 1934.

<sup>16</sup> Consommation et Production de Coke en Meurthe-et-Moselle, *Annales de Géographie*, Vol. 39, 1930, p. 333.

<sup>17</sup> Finance-Minister Dietrich, in evidence before the Nürnberg Military Tribunal, claimed that it was his policy to "give the French an interest in the Ruhr coal, and vice versa, give the Ruhr an interest in the French Minette"; *Trials of War Criminals*, VI, *The Flick Case*, Washington, 1952, p. 224.

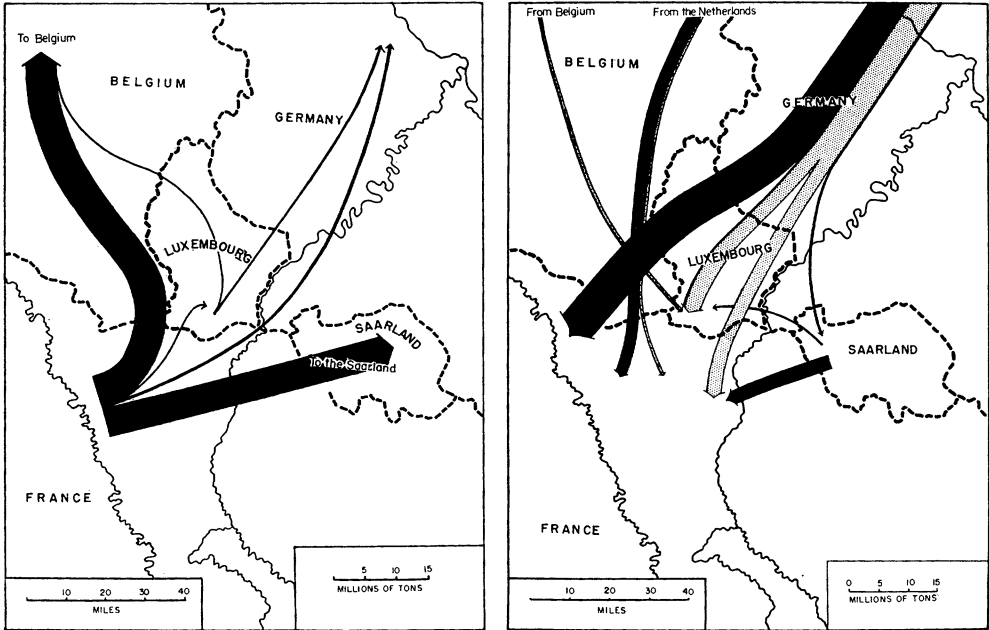


FIG. 6 (left). Movement of iron ore from the minette region of Lorraine and Luxembourg, 1937.

FIG. 7 (right). Movement of coal and coke to the minette region of Lorraine and Luxembourg, 1937. Belgian exports to France (3,396,000 tons of coal and 620,000 tons of coke were almost certainly destined for other parts of France and are not shown on this map).

### THE POST-WAR PERIOD

The trading pattern, lastly, that has emerged since the end of the Second World War is in its essentials very similar to that which existed between the two wars. German purchases of ore from Sweden have been considerably reduced, but this has been more than offset by the very marked increase in the production of domestic ore, especially the low-grade, phosphoric ores from Peine and Salzgitter in Lower Saxony. Imports from France have been reduced even below the low level of the inter-war years, and it is doubtful whether in 1951 much more than 1 per cent of the German pig iron has been actually smelted from Lorraine ore.

At the same time the dependence of Lorraine on coke and coking coal from the Ruhr remains considerable, and it is difficult to see how this liability can be greatly diminished. In 1951, about half

the coke required was imported, and two-thirds of this came from the Ruhr. Again the iron smelting firms of Lorraine are complaining that coal deliveries from Germany are both inadequate in quantity and poor in quality. The report for 1951 on *La Région économique de l'Est* complained that the area had been able to get from Germany only 770,000 tons a month out of a million tons required, and that in consequence the smelting industry operated at only 80 per cent of its capacity.<sup>18</sup> There has been no radical change in the situation since this date, though a group of French iron and steel firms have recently combined to purchase a group of coal-mines in the Ruhr in order to improve their fuel situation.<sup>19</sup>

<sup>18</sup> Situation de l'Economie Régionale en 1951, *Bulletin périodique de la Région économique de l'Est*, 1952, p. 49.

<sup>19</sup> Steel Developments in France, *Monthly Statistical Bulletin, British Iron and Steel Federation*, Vol. 30, No. 8, August, 1955.

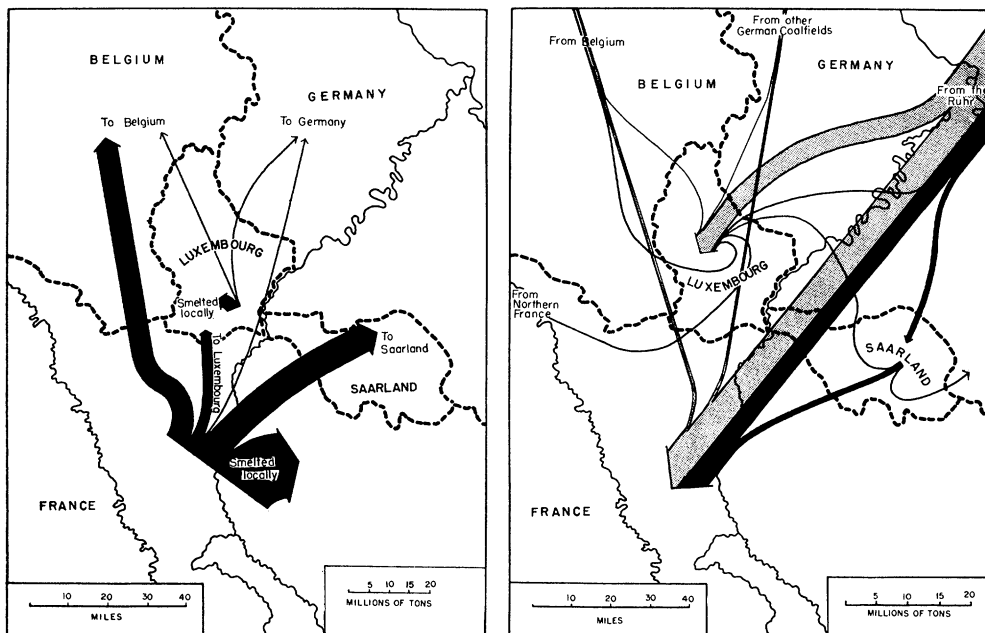


FIG. 8 (left). Movement of iron ore from the minette region of Lorraine and Luxembourg in 1950.

FIG. 9 (right). Movement of coal and coke to the minette region of Lorraine and Luxembourg, 1950. Coal is shown in black, coke by stipple shading.

### CONCLUSION

Two questions remain, one technical, the other political and economic. What would be the effect on the trade in iron ore if the Moselle were made navigable? This proposition was canvassed very actively in Germany in the 1880's and 90's, that is, before Swedish ore had come to be used on a large scale and when there was every prospect of an increasing German dependence on the minette.<sup>20</sup> But thereafter Ruhr interests tended in general to oppose a step that would result in cheapening fuel and thus pig iron in the Lorraine. It remains true

<sup>20</sup> There is a very extensive literature from the period before 1914 on the canalization of the Moselle, especially Hermann Schumacher, *Die westdeutsche Eisenindustrie und die Moselkanalisierung*, 2 vols., Leipzig, 1910. Recent surveys of the problem are: J. Levainville: "La Canalisation de la Moselle," *Annales de Géographie*, Vol. 37, 1928, pp. 180-184; "Die Kanalisierung der Mosel von Metz bis Diedenhofen und ihre wirtschaftliche Bedeutung," *Stahl und Eisen*, Vol. 52, No. 2, 1932, pp. 963-964.

today that the canalization of the Moselle would be likely to benefit Lorraine rather than the Ruhr. At the moment there is an active movement in its favor in Metz, and it seems that German opposition to the project is weakening.

The second question concerns the possible consequences of the creation of a common market for coal, iron, and steel. It has been suggested in the press that a more vigorous exchange of Ruhr coal for Lorraine ore might result. But this view fails to take account of the fact that the operation of a smelting works is normally geared to a specific type of ore or mixture of ores. Any change in the furnace charge would be likely to disorganize all subsequent stages. It is by no means clear yet that the operation of the Common Market would make minette cheaper in the German market relative to Swedish ore.

The dis-economies of a technological order that would attend such a change from Swedish to Lorraine ore makes such a transition highly improbable. The most that can be expected is that minette may perhaps replace the low-grade, phosphoric ore which some of the German smelting works now obtain from mines in Lower Saxony. But, at present, transport costs do not favor such a change.

The operation of the Common Market on the fuel supply to the Lorraine smelting industry is quite different. Ruhr coal and coke are in great demand, and the difficulty has been that the French have had to compete for it in the German market with the German consumers. There can be no question that this has deliberately been made difficult for the French. The removal of German discriminatory practices, including the breakup of the new coal cartel and the termination of discriminatory freight rates, cannot do other than make the Ruhr fuel more easily accessible to the Lorraine industrialist.

The possibility of the greater use of Saar coal and of coal from the continuation into Lorraine of the Saar field cannot be excluded. Experiments in blending and coking the coal from this field have met with considerable success, though the processes remain complex and costly. At present Ruhr coke is preferred on both technical and economic grounds.

To summarize: During the period of 80 or 90 years, during which there has

been an exchange of raw materials between the Ruhr and Lorraine-Luxembourg, there have been considerable fluctuations in the dependence of each on the other. In general the minette region has derived from a half to two-thirds of its fuel supply from the Ruhr, and would certainly have taken more had it been able. The dependence of the Ruhr on minette has never amounted to more than 20 per cent of its total need, and for over half a century has been a great deal less. During the whole period it has probably not averaged much more than 10 per cent.<sup>21</sup>

The importance of political factors in keeping this degree of interdependence as low as it has been must not be exaggerated. They were probably of some significance between the wars, but the trends which were manifest then had actually appeared before 1914; namely, the increasing dependence of Germany on Swedish ore and the rise of a large smelting capacity on the minette field. More important than the political, however, have been the technological factors: the improving ratio of coke to ore, the better design of the furnaces, and the adjustment of steel and rolling mills to the output of the furnace. A pattern in these respects had been formed early in the present century and it has since changed very little.

<sup>21</sup> See W. Parker in N. J. G. Pounds and W. Parker, *Coal and Steel in Western Europe* (London).