Can Know-How Be Transferred? Evidence from the Allied Investigation of German Industry after World War II*

Sebastian Hager† Marcel Schlepper‡ Timo Wochner§

November 20, 2026

Abstract

After the defeat of Germany in the Second World War, the United Kingdom and the United States engaged in a large-scale program of 'intellectual reparations'. British and U.S. experts investigated firms and production plants across Germany to collect technological expertise that could benefit their private industries. In this paper, we provide the first systematic and quantitative analysis of this unprecedented program of intellectual reparations. We present a newly assembled dataset on the universe of the investigations, which allows us to map the extent of the resulting knowledge transfers. We provide facts on the German firms, industries, and technologies that were investigated. Moreover, we link the investigated German firms to the investigating U.S. firms to directly observe knowledge transfers.

*We want to thank the Deutsches Museum in Munich, the Imperial War Museum and The National Archives in London, and the Rare Books collection of the Cambridge University Library for access to archival sources as well as the Library of Congress and the National Archives in Washington for information on their collection. We want to thank Mathias Bühler, Davide Cantoni, Fabian Gässler, Michela Giorcelli, Albrecht Glitz, Claudia Steinwender, and Fabian Waldinger for insightful conversations and valuable suggestions. Ruben Drosten, David Geiger, Lea Geißendörfer, Aaron Günther, Maximilian Nübling, Nils Süßenbach, Lissia Weber, and Ecem Yargizi provided excellent research assistance. We are also grateful to the Connex program of the Dr. Hans Riegel-Stiftung for financial support.

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1 Introduction

The Second World War (WWII) was a time of rapid technological innovation (e.g., Gross and Sampat, 2023). The advancement in technology did not stop with the war's end. Beginning in the immediate post-war period, the United States and the Soviet Union competed for global leadership in military and industrial technology. Allied post-war reparation programs explicitly targeting German science and technological know-how became a key tool in this race. Most famously, as part of the U.S. 'Operation Paperclip' and the Soviet 'Operation Osoaviakhim' thousands of German scientists were taken to work abroad on long-range missiles, aeronautics, and space programs (see, e.g., Uhl, 2001, Jacobsen, 2014). But these were not the only programs of 'intellectual reparations' that focused on German science and technology in the immediate post-war era.

A lesser-known program under the labels of BIOS, CIOS, and FIAT directly targeted Germany's industry – collecting detailed information on the know-how of individual firms and inventors. With the landing of the Western Allies in France in 1944, British and U.S. military forces immediately started to gather intelligence on German technology that could be useful for winning WWII. Soon, the Western Allies expanded their investigations to non-military technology. Between 1945 and 1947, U.S. and British investigators visited firms and production sites across Germany to gather any information that could be useful for private industries. One Washington official has called it 'the first orderly exploitation of an entire country's brainpower' (Walker, 1946).

In this paper, we provide the first systematic and quantitative analysis of this unprecedented program of intellectual reparations. Based on a hand-collected dataset on nearly all investigations of German firms, we present a series of findings on the extent of this program. We present facts on which German firms, industries, and technologies were investigated. Moreover, by linking the investigated German firms to the investigating U.S. firms, we can directly trace and analyse the resulting knowledge transfers.

We assemble a novel database on nearly all British and U.S. investigations of firms in Germany between 1945 and 1947. Based on archival sources, we hand-collect and digitise more than 90% of the reports written by British and U.S. investigating teams. These reports contain the findings of the investigations and explicitly list the set of investigated German firms. In total, the database contains 3,873 investigation reports and more than 20,000 firm investigations.

We present findings on three main aspects of the investigations. First, we study which firms in Germany were investigated. The reports detail the names of the inves-

tigated German firms, their locations, and which individuals were interviewed during the investigations. This allows us to map out the extent of the investigations. We show that firms were visited across Germany, with industrial centers being targeted the most. The British and U.S. investigators focused in particular on investigations in their own occupation zones.

Second, we analyse which technologies and industries were targeted by the investigations. We link the reports database to archival documents containing an industry categorisation. This allows us to consistently group reports into major industries. We find that the mechanical engineering and chemical industries were investigated most often. We also document that military-related industries were more strongly investigated in the early phase of the program. After WWII the focus shifted to industries with civilian applications whose know-how would be of more use for private industries in the United Kingdom and the United States.

Third, we observe which U.S. firms were involved in the investigations. Based on a list of U.S. personnel who were sent to Germany, we observe the employers of U.S. investigators. We link this information to our main database and thus observe which U.S. firms sent investigators to which German firms. Hence, we can directly measure knowledge transfers between German and U.S. firms. In further work, this can be used to examine the effects of access to German technological know-how on U.S. innovation and industrial performance.

These findings contribute to two literatures. First, we contribute to a broad literature on industrial policy in post-war settings. A large literature has studied the macroeconomic effects of post-war policies such as the Marshall Plan (see, for example, De Long and Eichengreen, 1991, Eichengreen and Uzan, 1992). Recent literature has focused on the microeconomic effects of industrial policy in post-war Europe (e.g., Poege, 2022) and the effects of war-time or post-war R&D spending on U.S. innovation (Kantor and Whalley, 2024, Gross and Sampat, 2023). While a few papers have explicitly studied the effects of war reparations on development (e.g., Mitrunen, 2024), this is the first paper to explicitly study intellectual reparations in the form of firm-to-firm knowledge transfers. We contribute to the literature on post-war industrial policy by assembling and analysing a novel database on one of the largest programs of intellectual reparations.

Second, we contribute to the literature on international technology diffusion.[1] Since knowledge transfers are difficult to measure directly, one strand in the literature

[1]For a comprehensive review of the literature, see for example Comin and Mestieri (2014).

focuses on the effects of migration on international knowledge diffusion (e.g., Hornung, 2014; Moser et al., 2014; Kerr et al., 2016). Recent papers in the literature have focused on knowledge transfers at the firm level (Giorcelli, 2019) or on the effects of industrial espionage (Glitz and Meyersson, 2020). In this paper, we study a government-backed program of firm-to-firm knowledge transfers. We contribute by building a dataset that allows us to link the investigating U.S. firms and the investigated German firms, thus observing knowledge transfers directly.

2 Historical Background

2.1 World War II and Reparations

The unconditional surrender of the German armed forces on 8 May 1945 marked the end of WWII in the European theatre. In June 1945, Germany was divided into four occupation zones governed under military law by France, the Soviet Union, the United Kingdom, and the United States. Four years later, they were succeeded by the founding of an East and a West German state.

After the war, Germany had to pay reparations to the Allied powers. For example, territory was ceded to Poland and the labour of German prisoners of war held in Allied nations was exploited. The Allies also agreed on a reduction of the German economic potential which allowed for the dismantling of German plants. While dismantling was most pronounced in the French and Soviet zones, it also happened in the British and U.S. zones. Especially for the United States, however, it soon became evident that heavy physical reparations would not offer many benefits due to the vast geographic distance. Instead, they set their sight on intellectual reparations such as research results, intellectual property, and technical innovation (Gimbel, 1990; O'Reagan, 2021). In line with international law, they initially aimed for innovation which had been applied to the military. However, even while the war was still ongoing, they had already extended the program to also include German civilian industry.

2.2 German Know-How as Intellectual Reparations

As part of the Allied war effort, the United Kingdom and the United States decided in summer 1944 to form a combined scientific and technical intelligence unit, the so-called Combined Intelligence Objectives Subcommittee (CIOS). Although CIOS was designed

as a joint civilian-military effort, its initial focus was to gather intelligence on Germany's military innovations in areas such as weapons, radar technology, and jet engines (Gimbel, 1990). It was also responsible to locate, detain, and interrogate German scientists and technicians who could posses such information. Its mission was to gather intelligence that could benefit the war against Japan. After the Allied landing in Normandy in the summer of 1944, CIOS sent its first specialist teams of investigators to Paris and soon afterward to other liberated cities, such as Nancy, Luxembourg, and Brussels (Glatt, 1994). Already in September 1944, first calls emerged to also investigate 'economic and industrial intelligence targets of vital postwar interest, but not of immediate military value' (Gimbel, 1990, p. 6).

To deal with the expansion of the program, the United Kingdom and the United States each created further agencies staffed with intelligence officers, military personnel, and civilians.[2] Their tasks included the compilation of a target list, the selection of individuals for the missions to Germany, and the training of investigators. They were also responsible for seizing and securing important targets, organising travel logistics and hospitality, and facilitating the distribution of findings through reports. After the war had ended, in July 1945 the combined headquarter of Allied forces and other combined organisations such as CIOS were terminated. To continue the intellectual reparation program, both the United Kingdom and the United States shifted the responsibility to national agencies. The two most notable ones were the U.S. FIAT (Field Intelligence Agency, Technical) and the British BIOS (British Intelligence Objectives Subcommittee), which lent their names to the reports published on the investigations.

In late 1946, the military government in charge of Germany started to lobby for the program's termination (Gimbel, 1990). Over time, strategic reservations against the political and economic costs of the intellectual reparation program had increased. Firstly, in the emerging new geopolitical environment West Germany was no longer regarded as a defeated enemy but as a potential ally against the Soviet Union. Secondly, the reduction of occupation costs required a recovery of the German economy. The extraction of reparations was counter-productive in this regard. In February 1947, FIAT published a 'last call for Germany' (Gimbel, 1990, p.111) to invite U.S. companies to participate in a field trip. The United Kingdom and the United States agreed in February 1947 that no new investigations were permitted after 15 May of that year. All

[2]Details on all involved agencies and their particular responsibilities can be found in Gimbel (1990), Glatt (1994), and O'Reagan (2021).

investigations were terminated by 30 June 1947 – less than a month after the Marshall Plan had been announced.

Figure 1: CIOS INVESTIGATION TEAM, SUMMER 1945

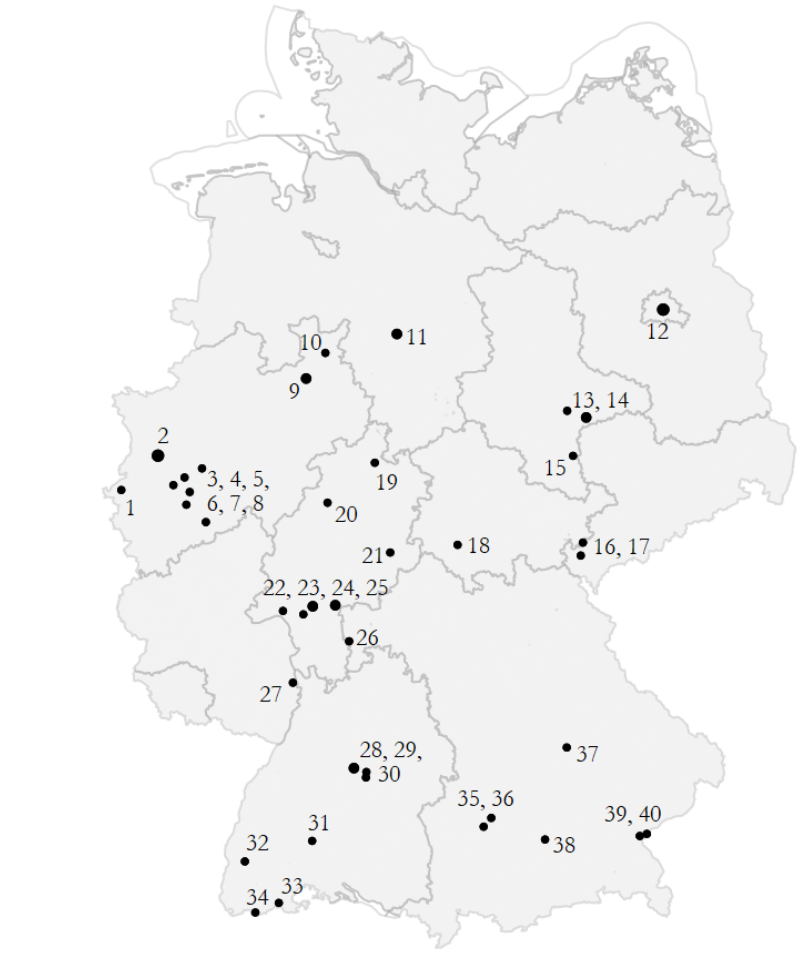


Notes: This figure shows members of the team reporting on their investigations on synthetic fibre developments in CIOS report XXXIII-50. The investigations took place from 28 June to 14 September 1945. The team included five U.S. and four British investigators. The picture shows the investigators in military uniforms: Leroy H. Smith, Dr. G. Preston Hoff, Dr. Joseph B. Quig, Dr. Jan J. Schilthuis, Dr. Dan B. Wicker (all U.S.) and Dr. Rowland Hill, Dr. F. Stanley Brown, Geoffrey Loasby, and Dr. David Traill (all British). The picture has been provided by the Deutsche Museum in Munich - for details see Appendix A.

By that time, teams of British and U.S. private-industry employees had investigated German firms for over two years. For instance, four British and five U.S. investigators shown in Figure 1 travelled through Germany from 28 June to 14 September 1945. They gathered information on synthetic fibre developments presented in CIOS report XXXIII-50. In total, they investigated 56 firms located throughout Germany – from the Ruhr area to Munich (see Figure 2). They even investigated a few firms located in what was to become the Soviet zone – before the area was handed over by U.S. troops. While the investigators were employees of private companies, they were given military authority and uniforms for their investigations in Germany. In line with military law, German firms had to share all requested information. However, information was overwhelmingly shared voluntarily, for example, to gain preferential treatment by the occupiers. CIOS report XXXIII-50 states 'when the individual found the investigators [...] could use military force if necessary, we had no further trouble and received accurate

information. In most cases, the Germans involved were quite proud of their research work and development and were happy to talk about them.'

Figure 2: EXEMPLARY TRAVEL ROUTE: CIOS REPORT XXXIII-50

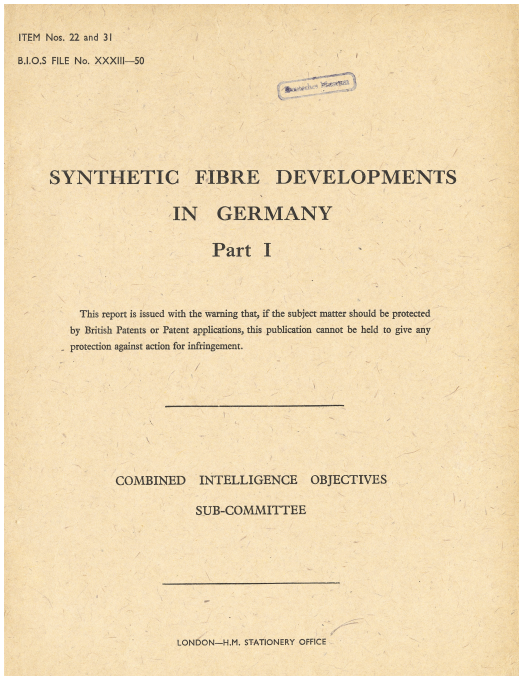


(1) Vereinigte Glanzstoff-Fabriken AG	(11) D. Wollwäscherei und -kämmerei	(21) Val. Mehler Segeltuchweberei AG	(31) I.G. Farbenindustrie AG
(2) Joh. Kleinewefers Söhne	(11) Continental Gummiwerke AG	(22) I.G. Farbenindustrie AG	(32) Rhodiaseta AG
(2) Rheinische Kunstseide AG	(12) Spinnfaser AG	(23) Vereinigte Glanzstoff-Fabriken AG	(33) Lonza-Werk
(2) Rheinische Zellwolle AG	(12) KWI für Physikalische Chemie	(24) I.G. Farbenindustrie AG	(34) Lonzana AG für Acetatprodukte
(3) Kampf & Spindler	(13) Eilfeld AG	(24) I.G. Farbenindustrie AG	(35) I.G. Farbenindustrie AG
(4) I.G. Farbenindustrie AG	(14) I.G. Farbenindustrie AG	(25) Condux-Werke (H.A. Merges KG)	(36) Augsburger Kammgarn-Spinnerei
(5) Glanzstoff-Courtaulds	(14) I.G. Farbenindustrie AG	(25) W.C. Heraeus GmbH	(37) Süddeutsche Zellwolle AG
(6) I.G. Farbenindustrie AG	(15) I.G. Farbenindustrie AG	(26) Vereinigte Glanzstoff-Fabriken AG	(38) Agfa Camerawerke
(7) I.G. Farbenindustrie AG	(16) Vereinigte Glanzstoff-Fabriken AG	(27) I.G. Farbenindustrie AG	(39) I.G. Farbenindustrie AG
(8) Rheinische Zellwolle AG	(17) Sächsische Zellwolle AG	(28) Werner & Pfleiderer	(40) Dr. Alexander Wacker GmbH
(9) Hermann Windel GmbH	(18) Thüringische Zellwolle AG	(28) Maschinenfabrik Gg. Kiefer GmbH	
(9) Seydel Maschinenfabrik GmbH	(19) Spinnfaser AG	(29) Fritz Müller Pressenfabrik	
(10) C.A. Delius & Söhne	(20) I.G. Farbenindustrie AG	(30) Zellwoll-Lehrspinnerei	

Notes: This figure shows all firm investigations in Germany covered in CIOS report XXXIII-50. Larger dots indicate that multiple firms were located in one municipality. The map is based on the municipality and state structure from 2023. Appendix Table B.1 lists the respective dates of each investigation (from 28 June to 14 September 1945).

Figure 3: EXAMPLE: CIOS REPORT XXXIII-50 ON SYNTHETIC FIBRE DEVELOPMENT

(a) Cover page



ITEM Nos. 22 and 31

B.I.O.S FILE No. XXXIII—50

SYNTHETIC FIBRE DEVELOPMENTS IN GERMANY

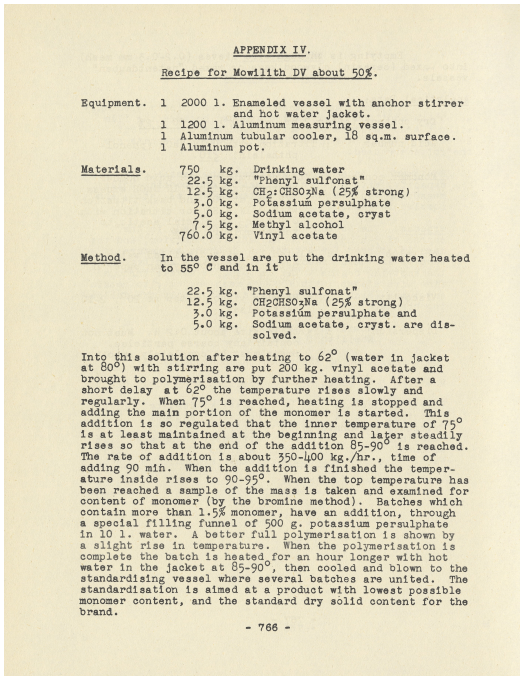
Part I

This report is issued with the warning that, if the subject matter should be protected by British Patents or Patent applications, this publication cannot be held to give any protection against action for infringement.

COMBINED INTELLIGENCE OBJECTIVES SUB-COMMITTEE

LONDON—H.M. STATIONERY OFFICE

(b) Product recipe



APPENDIX IV.

Recipe for Mowilith DV about 50%.

Equipment. 1 2000 l. Enameled vessel with anchor stirrer and hot water jacket.
1 1200 l. Aluminum measuring vessel.
1 Aluminum tubular cooler, 18 sq.m. surface.
1 Aluminum pot.

Materials.
750 kg. Drinking water
22.5 kg. "Phenyl sulfonat"
12.5 kg. $CH_2:CHSO_3Na$ (25% strong)
3.0 kg. Potassium persulphate
5.0 kg. Sodium acetate, cryst
7.5 kg. Methyl alcohol
760.0 kg. Vinyl acetate

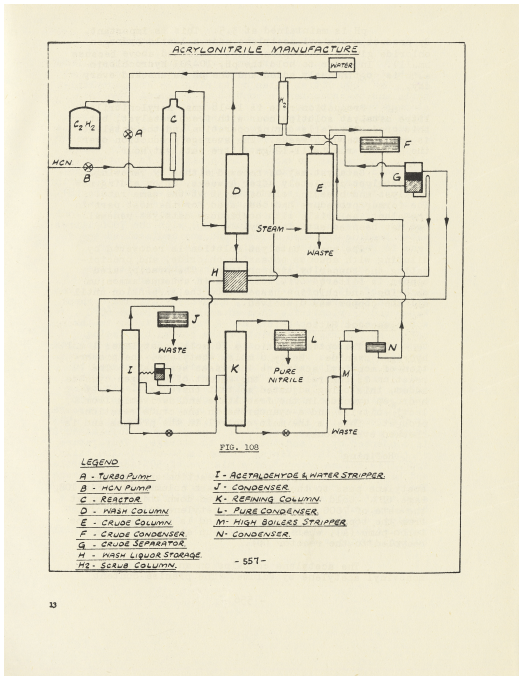
Method. In the vessel are put the drinking water heated to 55° C and in it

22.5 kg. "Phenyl sulfonat"
12.5 kg. CH_2OHSO_3Na (25% strong)
3.0 kg. Potassium persulphate and
5.0 kg. Sodium acetate, cryst. are dissolved.

Into this solution after heating to 62° (water in jacket at 80°) with stirring are put 200 kg. vinyl acetate and brought to polymerisation by further heating. After a short delay at 62° the temperature rises slowly and regularly. When 75° is reached, heating is stopped and adding the main portion of the monomer is started. This addition is so regulated that the inner temperature of 75° is at least maintained at the beginning and later steadily rises so that at the end of the addition 85-90° is reached. The rate of addition is about 350-400 kg./hr., time of adding 90 min. When the addition is finished the temperature inside rises to 90-95°. When the top temperature has been reached a sample of the mass is taken and examined for content of monomer (by the bromine method). Batches which contain more than 1.5% monomer, have an addition, through a special filling funnel of 500 g. potassium persulphate in 10 l. water. A better full polymerisation is shown by a slight rise in temperature. When the polymerisation is complete the batch is heated for an hour longer with hot water in the jacket at 85-90°, then cooled and blown to the standardising vessel where several batches are united. The standardisation is aimed at a product with lowest possible monomer content, and the standard dry solid content for the brand.

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(c) Plant structure



Notes: This figure presents pages from CIOS report XXXIII-50 which covers three months of investigations on more than 1,000 pages. Panel (a) shows the cover page including the title 'Synthetic Fibre Developments in Germany'. Panel (b) presents the recipe for the glue Mowilith DV which is according to the report an innovation on 'the most important single product manufactured' by I.G. Farbenindustrie AG in Höchst. Panel (c) sketches the plant for the production of the chemical intermediate acrylonitrile at I.G. Farbenindustrie AG in Leverkusen. The report includes dozens of such recipes and plant sketches as well as pictures and drawings of machinery. The pictures have been provided by the Deutsche Museum in Munich - for details see Appendix A.

2.3 Reports on Investigations

The United States attempted to distribute the knowledge gained through intellectual reparations. With Executive Order 9604 from summer 1945, U.S. President Truman ordered to release all scientific and industrial information obtained from the enemy to the public (Gimbel, 1990). This included the so-called 'final reports' which British and U.S. investigators were supposed to write on the German firms they had investigated (Gimbel, 1990). Written under the joint CIOS label in early 1945, the first of the reports were meant for circulation within the government only (Glatt, 1994). Following Truman's Executive Order, both governments decided to publish the reports. The reports provided the means to share the knowledge gathered in Germany with the wider British and U.S. industry – beyond those firms sending their own investigators. After the CIOS program had ended, both the investigations and the reports were administrated separately by BIOS and FIAT. The governments continued, however, to exchange reports which then could be read and bought in public libraries both across the United Kingdom and the United States.

Many reports contained commercially exploitable business secrets. For example, the CIOS report XXXIII-50 includes product recipes and plant sketches from I.G. Farbenindustrie AG, which was among the globally leading chemical companies at the time (see Figure 3). After reading this report, one American manufacturer remarked: 'This report would be worth twenty million dollars to my company if it could have it exclusively' (Walker, 1946). Also, the Soviet Union purchased every single report (Walker, 1946). Experts reviewing some of the findings at the I.G Farbenindustrie plants judged that 'this windfall information will advance the American dye industry by at least 5 years, and will save millions of dollars in terms of new products and man-hours of research' (U.S. Department of Commerce, 1947). Information in the reports were considered 'so valuable that to get it a single day ahead of a competitor may be worth thousands of dollars' (Walker, 1946). An U.S. aircraft company responded to the question whether the information in the reports had made the company any money with: 'Yes -— at least a hundred thousand dollars' (Walker, 1946). Others were less optimistic on the overall value of reports. O'Reagan (2021) suggests that the most important findings were not written in reports and were rather kept secret by the investigators. He also argues that no matter how well a report was written, firms could not reproduce the described technology. Irrespective of the reports' value to firms not

involved in the investigations, reports such as CIOS XXXIII-50 illustrates well that many investigators collected important technical know-how in Germany.

3 Data

3.1 Data Sources

Investigation Reports

The final reports are key to understanding the extent of the investigation program. They contain all relevant information on the names and locations of the German firms that were investigated. While investigators could purposely not report on specific discoveries made at individual firms, they had to fully document their itinerary. As transportation was provided by government agencies, these were well-informed about the German firms each investigator had investigated. The investigation reports, hence, provide the full picture on which German firms were investigated by which investigators.

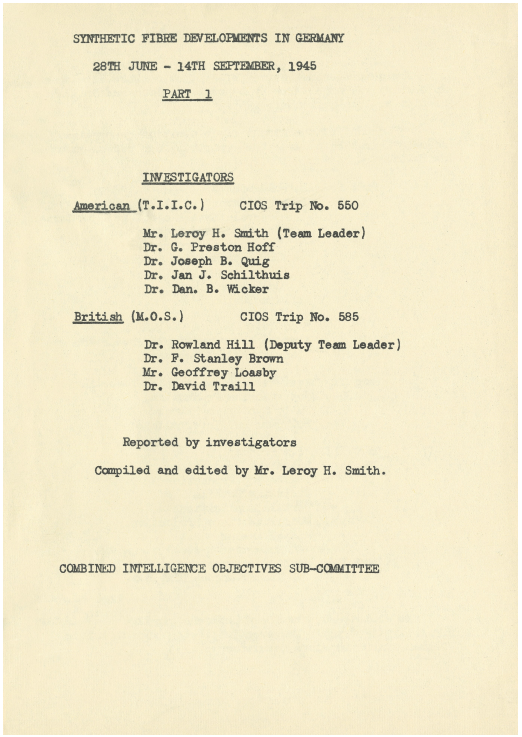
We digitise information from the full stock of BIOS, CIOS, and FIAT reports archived at the Deutsches Museum in Munich and the Imperial War Museum in London.[3] We processed more than 150,000 pages of paper. Our database is the first systematic and comprehensive collection of information on the investigations. For each final report, we collect information on the investigators (names, military ranks, private-sector employers), the investigations (date and location), investigated German firms (names and interviewed employees), and the publication itself (report number, title, date, classification, and pages). Generally, the reports were supposed to include all this information to be informative for intelligence agencies and private businesses alike. Figure 4 shows how this information is presented in the reports.

Going beyond the illustrative example provided by CIOS report XXXIII-50, the reports are in general relating well to a program aimed at collecting insights into the German industry. This can be shown by analysing the words employed most often in the reports' titles (see Figure B.2 in the Appendix). The most used words are either economic or corporate terms (e.g., manufacture, industry, production, research, and development), describe the approach to collect information (e.g., investigation, interrogation, and report) or refer to a German firm's name (e.g., *Farbenindustrie*).

[3]The reports have never been digitised, forcing us to manually extract information from the physical copies of the reports. In fact, the archives in the United States have not cataloged the reports yet, with the exception of CIOS at NARA and FIAT at the Library of Congress.

Figure 4: EXAMPLE: EXTRACTING INFORMATION FROM REPORTS

(a) Investigators



SYNTHETIC FIBRE DEVELOPMENTS IN GERMANY

28TH JUNE - 14TH SEPTEMBER, 1945

PART 1

INVESTIGATORS

American (T.I.I.C.) CIOS Trip No. 550

Mr. Leroy H. Smith (Team Leader)
Dr. G. Preston Hoff
Dr. Joseph B. Quig
Dr. Jan J. Schilthuis
Dr. Dan. B. Wicker

British (M.O.S.) CIOS Trip No. 585

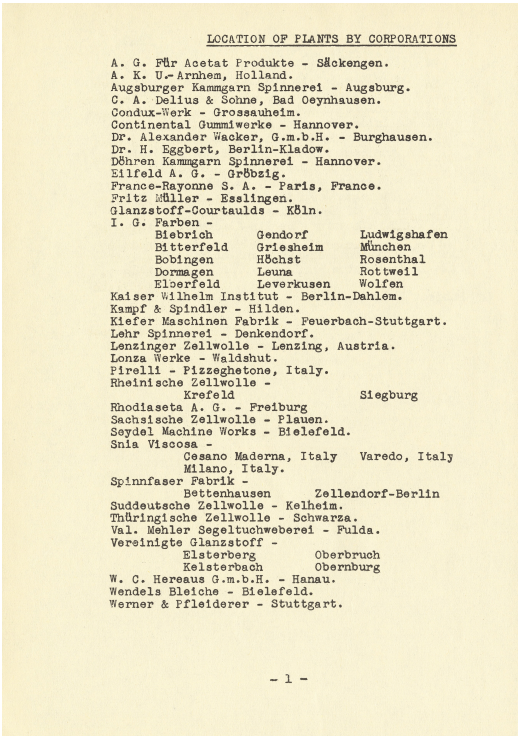
Dr. Rowland Hill (Deputy Team Leader)
Dr. F. Stanley Brown
Mr. Geoffrey Loasby
Dr. David Traill

Reported by investigators

Compiled and edited by Mr. Leroy H. Smith.

COMBINED INTELLIGENCE OBJECTIVES SUB-COMMITTEE

(b) German firms



LOCATION OF PLANTS BY CORPORATIONS

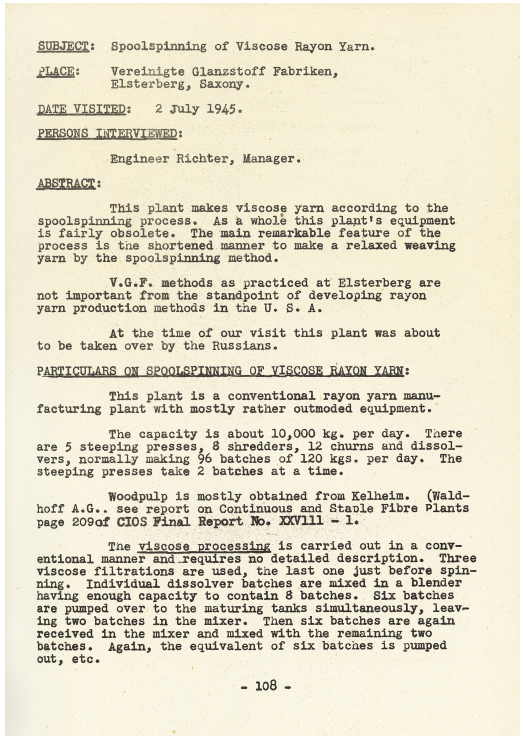
A. G. Für Acetat Produkte - Säckengen.
A. K. U. - Arnhem, Holland.
Augsburger Kammgarn Spinnerei - Augsburg.
C. A. Delius & Sohne, Bad Oeynhausen.
Condux-Werk - Grossauheim.
Continental Gummiwerke - Hannover.
Dr. Alexander Wacker, G.m.b.H. - Burghausen.
Dr. H. Eggbert, Berlin-Kladow.
Döhren Kammgarn Spinnerei - Hannover.
Eilfeld A. G. - Gröbzig.
France-Rayonne S. A. - Paris, France.
Fritz Müller - Esslingen.
Glanzstoff-Courtaulds - Köln.
I. G. Farben -

Biebrich	Gendorf	Ludwigshafen
Bitterfeld	Griesheim	München
Bobingen	Höchst	Rosenthal
Dormagen	Leuna	Rottweil
Elberfeld	Leverkusen	Wolfen

Kaiser Wilhelm Institut - Berlin-Dahlem.
Kampf & Spindler - Hilden.
Kiefer Maschinen Fabrik - Feuerbach-Stuttgart.
Lehr Spinnerei - Denkendorf.
Lenzinger Zellwolle - Lenzing, Austria.
Lonza Werke - Waldshut.
Pirelli - Pizzeghetone, Italy.
Rheinische Zellwolle -
Krefeld Siegburg
Rhodiaseta A. G. - Freiburg
Sachsische Zellwolle - Plauen.
Seydel Machine Works - Bielefeld.
Snia Viscosa -
Cesano Maderna, Italy Varedo, Italy
Milano, Italy.
Spinnfaser Fabrik -
Bettenhausen Zellendorf-Berlin
Suddeutsche Zellwolle - Kelheim.
Thüringische Zellwolle - Schwarza.
Val. Mehler Segeltuchweberei - Fulda.
Vereinigte Glanzstoff -
Elsterberg Oberbruch
Kelsterbach Obernburg
W. C. Hereaus G.m.b.H. - Hanau.
Wendels Bleiche - Bielefeld.
Werner & Pfleiderer - Stuttgart.

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(c) Details of investigation



SUBJECT: Spoolspinning of Viscose Rayon Yarn.

PLACE: Vereinigte Glanzstoff Fabriken,
Elsterberg, Saxony.

DATE VISITED: 2 July 1945.

PERSONS INTERVIEWED:

Engineer Richter, Manager.

ABSTRACT:

This plant makes viscose yarn according to the spoolspinning process. As a whole this plant's equipment is fairly obsolete. The main remarkable feature of the process is the shortened manner to make a relaxed weaving yarn by the spoolspinning method.

V.G.F. methods as practiced at Elsterberg are not important from the standpoint of developing rayon yarn production methods in the U. S. A.

At the time of our visit this plant was about to be taken over by the Russians.

PARTICULARS ON SPOOLSPINNING OF VISCOSE RAYON YARN:

This plant is a conventional rayon yarn manufacturing plant with mostly rather outmoded equipment.

The capacity is about 10,000 kg. per day. There are 5 steeping presses, 8 shredders, 12 churns and dissolvers, normally making 96 batches of 120 kgs. per day. The steeping presses take 2 batches at a time.

Woodpulp is mostly obtained from Kelheim. (Waldhoff A.G.. see report on Continuous and Staple Fibre Plants page 209of CIOS Final Report No. XXVlll - 1.

The viscose processing is carried out in a conventional manner and requires no detailed description. Three viscose filtrations are used, the last one just before spinning. Individual dissolver batches are mixed in a blender having enough capacity to contain 8 batches. Six batches are pumped over to the maturing tanks simultaneously, leaving two batches in the mixer. Then six batches are again received in the mixer and mixed with the remaining two batches. Again, the equivalent of six batches is pumped out, etc.

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Notes: This figure shows how the relevant information is presented based on the CIOS report XXXIII-50. Panel (a) presents the names of the British and U.S. investigators who were part of the investigations. For the U.S. investigators George P. Hoff, Leroy H. Smith, Dr. Joseph B. Quig, Dr. Jan J. Schilthuis, and Dr. Dan B. Wicker, we know their private-sector U.S. employers from the investigator list. Panel (b) lists the German firms and their locations which have been investigated by this group. Panel (c) presents details on the investigation at 'Vereinigte Glanzstoff Fabriken' in Elsterberg on 2 July 1945 including the name and position of the German personnel that was interviewed. The pictures have been provided by the Deutsche Museum in Munich - for details see Appendix A.

Data coverage. To assess the completeness of our dataset, we distinguish between published and non-published reports. Out of 2,726 published reports more than 99% are included in our dataset (see Table B.2 in the Appendix). However, not every report has been published and made available to industry. Some reports were classified due to the sensitivity of the content or were not considered to contain sufficiently valuable technical information. These reports were only circulated within the administration. Our dataset includes another 1,150 of these non-published reports. A few reports, however, were of such low quality that they were not even circulated within the administration. With only limited copies of these reports being produced, some were not archived and, hence, can not be included in our dataset.[4] Naturally, our dataset does not cover investigations for which no report has been written. While every investigator was expected to submit a report, not everyone followed the rules. Yet our dataset still covers 89% of all potential reports.[5] In terms of firm investigations, the covered share should be even higher as the number of German firms in published reports is twice the number in non-published reports. Also, we do not expect strategic reasons for not submitting a report or writing it in poor quality, because investigators who wanted to hide their findings could have also written a proper report without sharing any valuable information.

Summary statistics. The initial dataset includes 3,873 reports. Not all of these reports allow us to extract information on investigated German firms. Some reports describe investigations at administrative and military offices, others translate scientific papers, or just do not mention individual firms. 352 reports do not cover investigations of firms (see Figure 5a). With 13% each, the share of such reports is largest for CIOS and FIAT. For CIOS this is mainly driven by reports on the government and military, while for FIAT those are primarily translations of scientific papers. In addition, 160 reports are exclusively on investigations of firms which are located outside of Germany (see Figure 5b). This is mainly relevant for CIOS reports as these were written before Germany was liberated.

[4]The archive of the Imperial War Museum in London, which is one of our data sources, is generally considered to be the archive with the most complete collection of final reports.

[5]We arrive at this number by taking the highest report number for each label (BIOS, CIOS, and FIAT) to calculate the amount of potentially missing reports. This is the most conservative estimate for completeness as it assumes that missing report numbers do actually exist. Missing report numbers could, in contrast, also be explained by reports being merged or teams not travelling to Germany. Hence, 89% should be seen as the lower bound for how complete our data collection is.

Figure 5: INFORMATION ON REPORTS



Notes: This figure shows in Panel (a) and (b) how we reduce the initial dataset to the final dataset. Panel (c) and (d) present summary statistics for the final dataset. Our initial dataset includes 3,873 reports: 1,756 BIOS, 974 CIOS, and 1,143 FIAT. Not all these reports contain valuable information on investigations of German firms. Panel (a) shows the number of reports which are not on a firm investigation. Panel (b) shows the number of reports that focus on firms located outside of Germany. Panels (c) and (d) do not include these 'not relevant' reports. For the final dataset, Panel (c) shows the share of reports published in libraries and offered for sale to companies. Panel (d) shows the share of reports initially classified as Secret, Confidential, or Restricted.

Our final dataset consists of 3,361 reports which all contain information on investigations of firms located in Germany. Figure 5c shows the share of published reports. Overall, 70% of the reports have been made available in public libraries and offered for sale. The largest share of reports was published for BIOS. Reasons for a report not being published were low quality, little insights, or a classification due to sensitive content. 529 reports were classified, which implies that sensitive content was the main reason for reports not being published (see Figure 5d). Non-published and classified reports

remain in our dataset as they provide valuable information on who was potentially able to extract knowledge from firms in Germany.

Investigator List

While reports mention the investigators who were collecting information on German firms, most reports do not state their employers. We collect data on all U.S. investigators from an index of U.S. personnel published in May 1947.[6] This document by the Department of Commerce lists the technical and administrative personnel associated with the investigations. Figure 6 is an excerpt from this list showing the name and location of a U.S. firm employing one of the investigators. It shows the entry for a U.S. investigator named LeRoy Smith, who worked at American Viscose Corporation in Roanoke, Virginia. The figure also lists three of the reports on investigations which LeRoy Smith was involved in.

As no investigators were permitted to enter Germany after May 1947, the list is a near-to-complete collection of civilian investigators. It allows us to understand which U.S. firms were involved in the investigation. Out of 1,143 FIAT reports and 974 CIOS reports, we are able to link 900 (79%) and 354 (36%) reports to someone on the investigator list, respectively.[7] This is a relatively high share, as many investigations were also conducted by technically educated soldiers (for FIAT and CIOS) and by British investigators (for CIOS).

Figure 6: INVESTIGATOR LIST

SMITH, LeRoy H. General Manager American Viscose Corp. Roanoke, Virginia	14473	FIAT 147	Bohnsen Continuous Shredder, Wolfgang Bei Hanau (Microfilm .50 Photostat $1.00)
	14517	FIAT 35	Bobbin Finning Process of Viscose Rayon Textile Yarn and of Yarn for Tire Cord at Snia Viscosa Cesano Maderno (Microfilm .50 Photostat $1.00)
	1113	FIAT 10	Continuous Process for Spinning Viscose Yarn at Zellwolle Lenzing Aktiengellschaft Lenzing Oberdonau Austria (Microfilm .50 Photostat $1.00)

Notes: This figure shows an excerpt from the investigator list. From this, we learn that Leroy H. Smith, an investigator from CIOS report XXXIII-50, was a general manager at American Viscose Corp. in Roanoke, Virginia. The company was a large rayon producer which relates well to the subject Mr. Smith was investigating in Germany. The company is also among the top three U.S. firms conducting investigations in Germany as shown in Table 2.

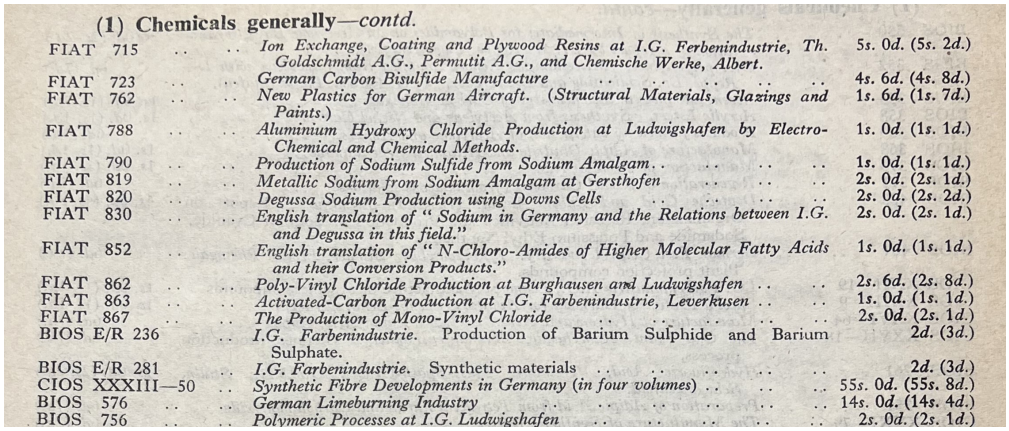
[6]For details on the employed archival sources see Appendix A.

[7]No list of British investigators and their employers is archived at The National Archives in London.

Topic List

The confidential topic list by H.M. Stationary provides an overview of the BIOS, CIOS, and FIAT reports that have been published in the United Kingdom until October 1949. It groups the reports into 21 categories such as Agriculture, Metal Industries, and Optical and Mechanical Precision Instruments. It also provides an even more detailed grouping into 221 subcategories. Figure 7 shows an excerpt for the category Chemicals, which lists the numbers and names of reports belonging to this category. Most reports are assigned to one category (47%) or two categories (39%), with 15% of the reports being assigned to more than two categories.

Figure 7: TOPIC LIST



(1) Chemicals generally—*contd.*

FIAT 715	*Ion Exchange, Coating and Plywood Resins at I.G. Ferbenindustrie, Th. Goldschmidt A.G., Permutit A.G., and Chemische Werke, Albert.*	5*s.* 0*d.* (5*s.* 2*d.*)
FIAT 723	*German Carbon Bisulfide Manufacture*	4*s.* 6*d.* (4*s.* 8*d.*)
FIAT 762	*New Plastics for German Aircraft.* (*Structural Materials, Glazings and Paints.*)	1*s.* 6*d.* (1*s.* 7*d.*)
FIAT 788	*Aluminium Hydroxy Chloride Production at Ludwigshafen by Electro-Chemical and Chemical Methods.*	1*s.* 0*d.* (1*s.* 1*d.*)
FIAT 790	*Production of Sodium Sulfide from Sodium Amalgam*	1*s.* 0*d.* (1*s.* 1*d.*)
FIAT 819	*Metallic Sodium from Sodium Amalgam at Gersthofen*	2*s.* 0*d.* (2*s.* 1*d.*)
FIAT 820	*Degussa Sodium Production using Downs Cells*	2*s.* 0*d.* (2*s.* 2*d.*)
FIAT 830	*English translation of "Sodium in Germany and the Relations between I.G. and Degussa in this field."*	2*s.* 0*d.* (2*s.* 1*d.*)
FIAT 852	*English translation of "N-Chloro-Amides of Higher Molecular Fatty Acids and their Conversion Products."*	1*s.* 0*d.* (1*s.* 1*d.*)
FIAT 862	*Poly-Vinyl Chloride Production at Burghausen and Ludwigshafen*	2*s.* 6*d.* (2*s.* 8*d.*)
FIAT 863	*Activated-Carbon Production at I.G. Farbenindustrie, Leverkusen*	1*s.* 0*d.* (1*s.* 1*d.*)
FIAT 867	*The Production of Mono-Vinyl Chloride*	2*s.* 0*d.* (2*s.* 1*d.*)
BIOS E/R 236	*I.G. Farbenindustrie.* Production of Barium Sulphide and Barium Sulphate.	2*d.* (3*d.*)
BIOS E/R 281	*I.G. Farbenindustrie.* Synthetic materials	2*d.* (3*d.*)
CIOS XXXIII—50	*Synthetic Fibre Developments in Germany* (*in four volumes*)	55*s.* 0*d.* (55*s.* 8*d.*)
BIOS 576	*German Limeburning Industry*	14*s.* 0*d.* (14*s.* 4*d.*)
BIOS 756	*Polymeric Processes at I.G. Ludwigshafen*	2*s.* 0*d.* (2*s.* 1*d.*)

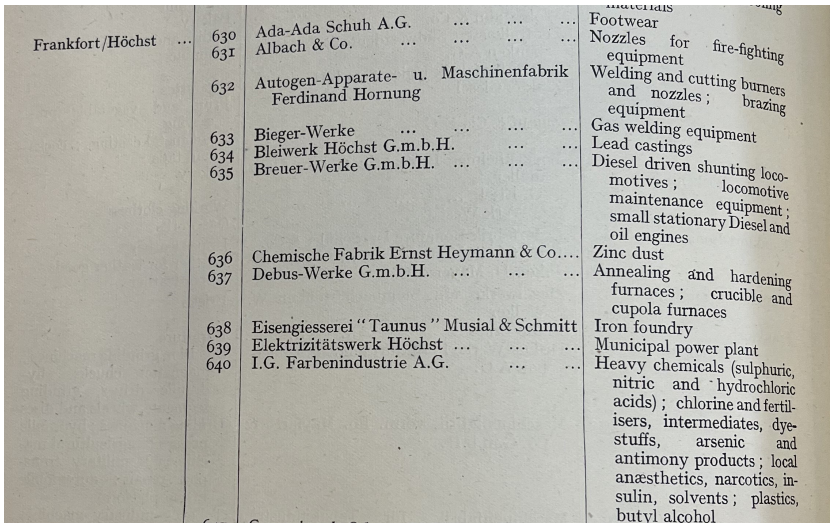
Notes: This figure shows an excerpt from the topic list. We learn that the CIOS report XXXIII-50 is categorised as dealing with Chemicals - more specifically its subcategory Generally. The report is also grouped to one further category and three further subcategories, which are all not shown in this figure.

Target List

The German Industry Survey provides an index of more than 6,000 relevant German firms which has been compiled by the Foreign Office and the Ministry of Economic Warfare. It is structured by geographic area in five books and excludes the Soviet zone. Gimbel (1990) refers to this as blue books providing guidance for the investigations. The target list was prepared in late 1944 and early 1945 (Gimbel, 1990). Initially, it was supposed to only include targets of military value which could benefit the war against Japan. But before the war had ended, it was already extended to also include the most relevant private-sector German firms which were known to Allied intelligence. The target list allows to differentiate between investigated German firms that were designated as

a target before the war was over and those for which the decision to investigate came later. Figure 8 shows an excerpt from the target list for the Hesse area providing names and location of firms as well as their products.

Figure 8: TARGET LIST



			Materials
Frankfort/Höchst ...	630	Ada-Ada Schuh A.G.	Footwear
	631	Albach & Co.	Nozzles for fire-fighting equipment
	632	Autogen-Apparate- u. Maschinenfabrik Ferdinand Hornung	Welding and cutting burners and nozzles; brazing equipment
	633	Bieger-Werke	Gas welding equipment
	634	Bleiwerk Höchst G.m.b.H.	Lead castings
	635	Breuer-Werke G.m.b.H.	Diesel driven shunting locomotives; locomotive maintenance equipment; small stationary Diesel and oil engines
	636	Chemische Fabrik Ernst Heymann & Co....	Zinc dust
	637	Debus-Werke G.m.b.H.	Annealing and hardening furnaces; crucible and cupola furnaces
	638	Eisengiesserei "Taunus" Musial & Schmitt	Iron foundry
	639	Elektrizitätswerk Höchst	Municipal power plant
	640	I.G. Farbenindustrie A.G.	Heavy chemicals (sulphuric, nitric and hydrochloric acids); chlorine and fertilisers, intermediates, dyestuffs, arsenic and antimony products; local anæsthetics, narcotics, insulin, solvents; plastics, butyl alcohol

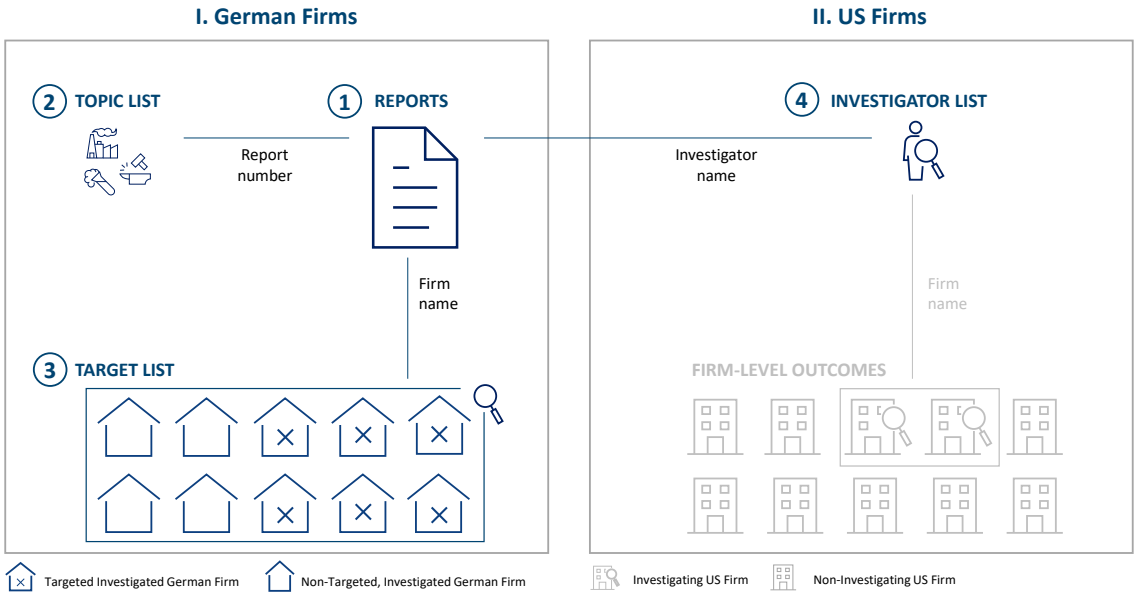
Notes: This figure shows an excerpt from the target list. We learn that I.G. Farbenindustrie AG was a suggested target for the city of Frankfurt. It was also visited by the investigators reporting on their findings in CIOS report XXXIII-50.

3.2 Final Dataset on Knowledge Transfers

Our dataset is centered around the investigations at German firms between 1945 and 1947. This dataset can be linked to other data on firm outcomes for U.S. firms that have sent their employees as investigators to Germany. To construct our dataset in such a way, we combine four distinct archival sources collected from three archives in Germany and the United Kingdom. To the best of our knowledge, none of these data sources has been employed for research before.

Figure 9 illustrates how the four data sources form the final dataset on the investigations. The main dataset is extracted from investigation reports that were written by British and U.S. investigators on German firms (see (1) in Figure 9). The reports provide the name and location of the investigated firms. Each report is assigned a unique number which allows us to match them to the topic list prepared by the British government (2). The topics are informative about the industry a German firm was active in. Based on whether a firm's name is included on a target list prepared before the end of the war, we also know whether a firm was deliberately targeted by British

Figure 9: LINKING DATA SOURCES



Notes: This figure shows how our dataset is constructed by linking four archival data sources. While the dataset is centred on German firms, the investigator list builds a bridge to U.S. firms. This allows to link investigated German firms to U.S. firms that sent their employees as investigators to Germany.

and U.S. investigators or merely visited by chance (3). Crucially, the investigator list allows us to link U.S. investigators to the U.S. firms they were employed at (4). In the future, we can add any firm-level data to the U.S. side of our dataset.

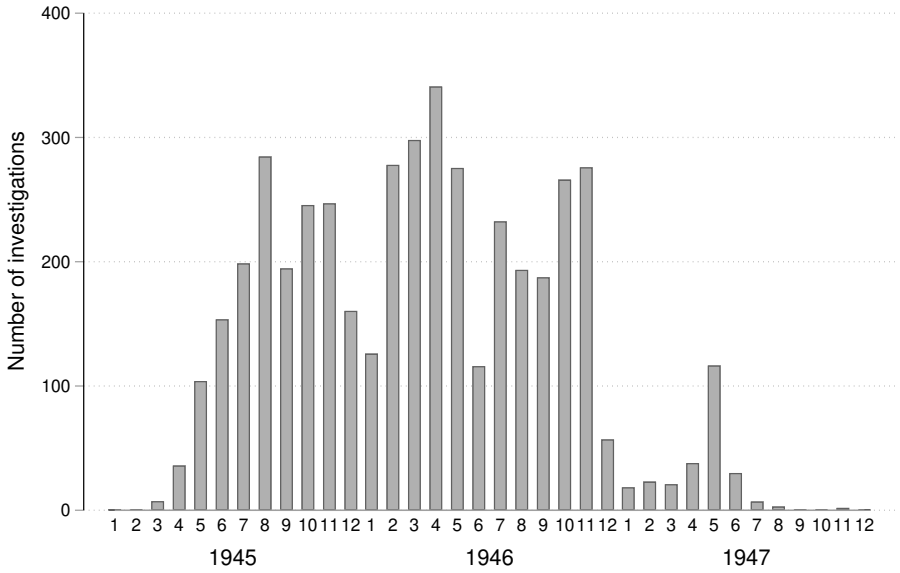
Overall, the key contribution of our dataset is to connect investigated German firms with investigating firms from the United States. Our dataset is informative about which U.S. firms received deep knowledge about specific German firms by sending their employees to conduct detailed investigations. For example, using balance sheet data we can investigate the effects of the investigations on the overall performance of participating firms. Alternatively, patent data can be used to study follow-on effects on U.S. innovation.

4 Mapping the Intellectual Reparations Program

In total, more than 20,000 investigations of German firms were conducted by British and U.S. investigators. The cumulative time spent on the investigations was 25,000 days (based on the subset of 50% of investigations which can be dated). Accordingly, the effort arising from this program was immense – both for the investigators and their administrations, but also for the German firms that had to receive and answer to the investigators. The busiest period lasted for 18 months from May 1945 to November 1946, when every month at least 100 dated investigations were conducted (see Figure 10).

While some investigations took place before the German surrender, the program increased in scale just when hostilities had ended in the European war theatre, which shows its predominantly civilian character. The last investigators were permitted to enter Germany in May 1947 and the program was terminated in July 1947. However, throughout 1947 the number of investigations was already low – with a small peak before the program's end. Figure 10 illustrates these temporal patterns.

Figure 10: NUMBER OF INVESTIGATED GERMAN FIRMS OVER TIME



Notes: This figure shows the number of firm investigations by British and U.S. investigators in Germany for each month between 1945 and 1947. The date is available for close to half of the investigations, implying that only a subset of investigations is shown here.

On average, an investigator team included three members, but numbers varied between one and eleven investigators. Since travel could be organised more easily from

the United Kingdom, British investigator teams were usually larger than those from the United States. In total, the investigators spoke to more than 29,000 employees of German firms. As most reports did not just include the names but also the occupations of these German employees, we can classify them in two groups: those with a managerial and those with a technical background. Based on this grouping, we observe that investigators interviewed German employees with managerial and with technical backgrounds to a similar degree. The share of employees with a doctoral degree among the interviewed was 40%. This shows that investigators did not just desire a superficial understanding of the business a firm was conducting, but rather to spot technical and scientific innovation that may prove valuable for British and U.S. industry.

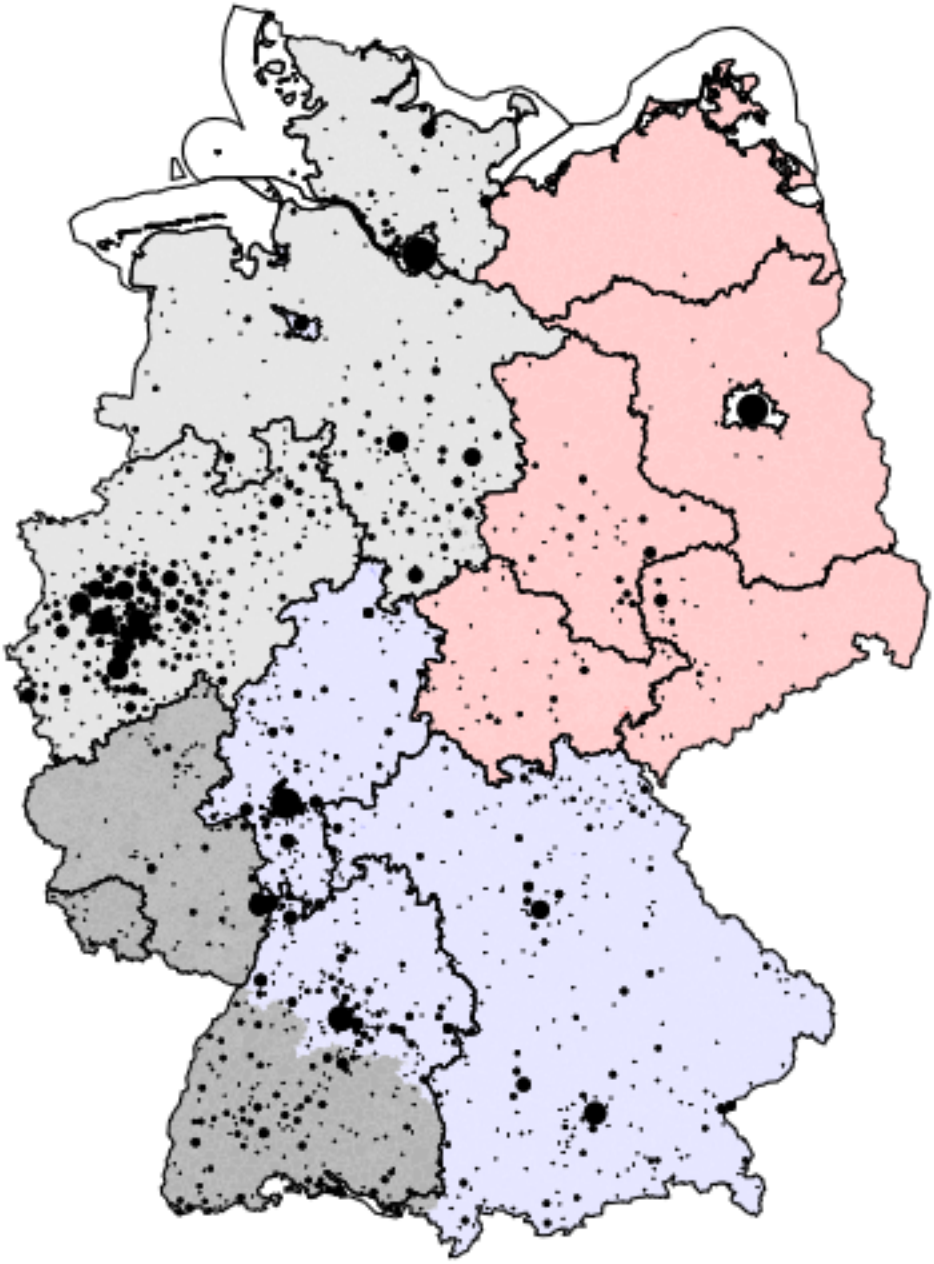
Our data suggests that investigating teams were operating under a busy schedule. Given the limited capacity to host and transport investigators, the trips were rather short. On the report level, the average days spent on investigations was 14 and the median was five. During this time, investigators attempted to see many German firms rather than just a few. The average number of firms investigated per report is six and the median is two. The travel itinerary in Section 2.2 illustrates how an investigating team traveled through the whole of Germany. The most common scenario was that investigators spent just one day at a German firm and very rarely was it more than five days (see Figure B.3 in the Appendix). The short time period spent at each German firm suggests that a high level of cooperation from the investigated German firms was necessary for the investigators to gain deeper insights.

4.1 Which German Firms Were Investigated?

We geolocate all investigated German firms.[8] Our findings show that investigations took place all over Germany (see Figure 11). In fact, investigated firms were located in more than 1,200 different municipalities. There is, however, a concentration of investigations in large municipalities. With 1,100 investigations, Hamburg is the most visited municipality, followed by Berlin (880), Frankfurt (860), and Düsseldorf (590). But also smaller municipalities with important firms were subject to frequent investigations. For example, the relatively unknown Krefeld and Ludwigshafen on the Rhine are among the top ten investigated municipalities with more than 350 investigations each. Both host a site of I.G. Farbenindustrie which was the most investigated German firm.

[8]We employ and, hence, refer to the current municipality structure from 2023.

Figure 11: LOCATION OF INVESTIGATIONS IN GERMANY



Notes: This figure shows the location of investigations. The size of the dots is proportional to the number of investigations in each municipality. Germany was divided into four occupation zones: Blue is the U.S. zone, light grey is the British zone, dark grey is the French zone, and red is the Soviet zone. The zone borders are based on a map by Kunz (2004). Investigations are extracted from the reports of BIOS, CIOS, and FIAT which include British and U.S. investigators, but not French or Soviet ones. The map is based on German borders as well as the municipality and state structure from 2023. Figure B.4 in the Appendix shows the location of investigations for the years 1945, 1946, and 1947 separately. Figure B.5 in the Appendix shows aggregate statistics for investigations by occupational zone.

We show that also firms in some parts of the Soviet zone were investigated by British and U.S. investigators. Plotting the location of investigations over time shows, however, that these investigations in the Soviet zone occurred nearly exclusively in 1945 (see Figure B.4 in the Appendix). The reason is that the respective territory was initially held by U.S. troops and, hence, could be investigated until July 1945 when it was handed over to the Soviets in exchange for access to Berlin. Apart from this, the pattern of municipalities visited by investigating firms remained broadly similar between 1945 and 1946. For 1947, the sharp decline in the number of investigations is also visible in the maps.

The majority of investigations by British and U.S. investigators was conducted in their own respective zones (see Figure B.5 in the Appendix). For example, 58% of the firms investigated by British teams (BIOS) were located in the British zone. Due to agreements between the United States and the United Kingdom, their investigators could also investigate pre-approved firms in the other's zone. In fact, 28% of the firms investigated by British investigators were located in the U.S. zone. For firms visited by U.S. investigators, the shares of 44% being in the U.S. and 37% being in the British zone are even closer. The low number of investigations in the French zone shows that investigation trips were to a certain degree limited by access to the desired German firms. This is well illustrated with the Soviet zone. While 20% of the CIOS investigations were of firms located in the Soviet zone, the number dropped to almost none after U.S. troops had retreated from that area. At the same time, Berlin became available for investigations by BIOS and FIAT teams which chose around 7% of their investigations to cover firms in Berlin.

Table 1 presents the ten German firms that have been investigated most often. The single most investigated German firm is I.G. Farbenindustrie AG. With around 1,300 investigations it comprises more than 5% of the overall program. For the remaining nine firms, the number of investigations is in the range of 80 to 200. As the program lasted for around two years, that is for each of the firms on average one to two investigations per week. All investigations at these ten German firms started either before the German surrender in May 1945 or immediately afterward. For four of the ten firms, the investigations had ended already in 1946, while they lasted for the remaining six until the end of the program in mid-1947. All firms were included on the target list which was compiled by U.S. intelligence in 1944. The ten most investigated firms were primarily associated with the electrical engineering and chemicals industries. Rheinmetall-Borsig AG was the only firm belonging to the category of armaments and ammunition.

Table 1: TOP 10 INVESTIGATED GERMAN FIRMS

	Name	Location	Number	First	Last	Target	Industry
1	I.G. Farbenindustrie AG	Frankfurt	1,312	09.03.45	20.06.47	Y	Chemical
2	Friedrich Krupp AG	Essen	195	14.04.45	03.06.47	Y	Metal
3	Dynamit Nobel AG	Troisdorf	140	28.04.45	27.05.47	Y	Chemical
4	Siemens Halske AG	Berlin	119	09.03.45	13.05.47	Y	E. Engineering
5	Siemens-Schuckertwerke AG	Berlin	114	15.04.45	22.04.47	Y	E. Engineering
6	Degussa GmbH	Frankfurt	112	09.03.45	13.12.46	Y	Chemical
7	Vereinigte D. Metallwerke GmbH	Frankfurt	99	28.05.45	04.11.46	Y	M. Engineering
8	Robert Bosch GmbH	Stuttgart	99	22.05.45	02.12.46	Y	E. Engineering
9	AEG AG	Berlin	93	08.05.45	13.05.47	Y	E. Engineering
10	Rheinmetall-Borsig AG	Düsseldorf	84	23.04.45	09.10.46	Y	Armaments

Notes: This table shows the ten German firms which have been investigated most often. As ten to 61 locations of each firm have been investigated, the table presents only the most investigated location. 'Number' gives the total number of investigations. The start date of the first investigation is given in 'First' and the finishing date of the last investigation is given in 'Last'. The information on whether a firm was a target is based on the target list. The industry is given as the category from the topic list which was most often assigned to a report on the firm. 'E. Engineering' is Electrical Engineering and 'M. Engineering' is Mechanical Engineering.

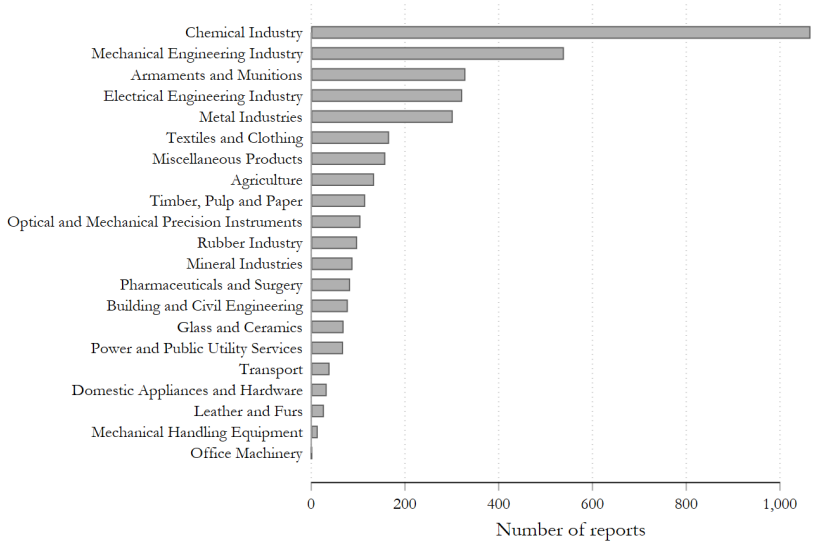
4.2 Which Industries Were Targeted?

Based on the topics assigned to reports, we can examine which industries were predominantly investigated. With more than 1,000 reports being devoted to it, the chemical industry received the most attention from British and U.S. investigators (see Figure 12a). Also, the mechanical engineering, the electrical engineering, and the metal industries are with 300 to 550 reports among the five most investigated industries. The target list shows that chemicals, engineering, and metals at that time were the most important industries of the German economy. In total, 2,900 of the 6,100 firms mentioned in the target list belong to either of these industries. The investigators, however, had a disproportionately large interest in the chemical industry. According to the target list, the chemical industry represented 11% of the firms considered to be most relevant, but 21% of the reports are about the chemical industry. Relative to the share of engineering and metal firms on the target list (26% and 10%), the share of reports on these industries is disproportionately small (17% and 6%).

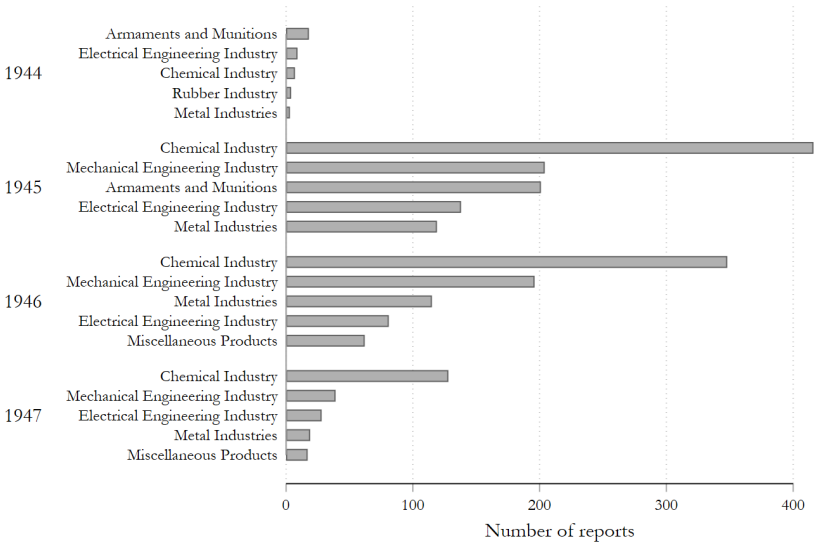
With its non-civilian products, the armaments and munition industry is an exception among the five most investigated industries. Figure 12b presents the development of reports dedicated to the top five industries over time. It shows that the defence industry was only of interest in the initial phase of the program in 1944 and 1945. Neither in 1946 nor in 1947 were armaments and munitions part of the top five investigated industries.

Figure 12: INDUSTRY FOCUS OF INVESTIGATIONS

(a) Investigated industries



(b) Top five investigated industries over time



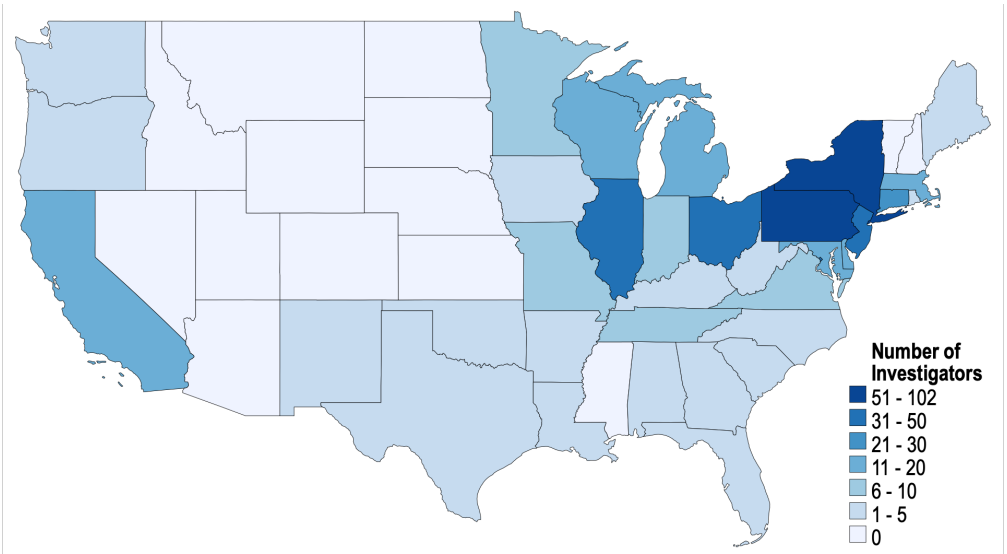
Notes: This figure shows the distribution of investigations over industries. Panel (a) plots the number of reports belonging to each of the 21 topic categories from the topic list. This information is only available for published reports. Panel (b) plots the number of reports for the top five categories from 1944 to 1947. The report date is available for close to half of reports, implying that Panel (b) shows a subset of reports from Panel (a). To illustrate the shift in the program's topical focus, we also include those reports from 1944 which are on firms and military infrastructure outside of Germany. Most reports are assigned to one category (47%) or two categories (39%), with 15% of reports assigned to more than two categories.

This suggests that the program's concentration on civilian industries increased over time – especially after both Germany and Japan had surrendered in 1945.

4.3 Which U.S. Firms Sent Investigators?

In the last part of this paper, we connect investigating U.S. firms to investigated German firms. This allows us to observe specific knowledge transfers. Based on the investigator list, we observe the employers for 491 U.S. investigators. Most of these investigators were sent by employers located in New York (102 investigators), Pennsylvania (61), and Washington, D.C. (42). Table B.3 in the Appendix lists the top ten states in terms of employed investigators. Figure 13 indicates that most investigators came from the East Coast and the Midwest. 15 states did not host a single firm sending an investigator to Germany. This geographic pattern even persists when accounting for population size (see Figure B.6 in the Appendix).

Figure 13: NUMBER OF U.S. INVESTIGATORS BY STATE



Notes: This figure shows the number of investigators from each U.S. state. The information on the location of investigators is drawn from the investigator list.

Table 2 lists the ten U.S. firms which have conducted most investigations in Germany as part of the intellectual reparation program. The number of total investigations by their employees varies between 62 and 201. Nine of the ten most active U.S. firms were located either on the East Coast or in the East of the Midwest. In line with the generally strong focus on the chemical industry, a majority of the ten firms was mainly involved with investigations of German firms operating in this industry. In addition,

Table 2: TOP 10 INVESTIGATING U.S. FIRMS

	Name	Location	Number	First	Last	Topic
1	E. I. duPont de Nemours & Comp.	DE, NJ	201	27.06.45	30.07.47	Chemicals
2	American Viscose Corp.	DE, VA, WV	152	27.06.45	06.09.45	Chemicals
3	Westinghouse Electric Corp.	NJ, NY, PA	102	01.06.45	14.11.45	M. Engineering
4	The American Enka Corp.	NC	93	27.06.45	06.09.45	Chemicals
5	American Lumber & Treating Comp.	IL	90	04.06.45	05.10.45	Timber
6	The Dow Chemical Comp.	MI	77	09.05.45	12.01.46	Chemicals
7	Newport News Shipbuilding	VA	74	24.06.45	02.08.45	Armaments
8	American Cyanamid Comp.	CT, NJ, NY	71	09.05.45	31.08.46	Chemicals
9	Allis-Chalmers Comp.	IL, WI	64	01.06.45	21.11.45	M. Engineering
10	Standard Oil Comp.	LA, NJ	62	25.03.45	30.09.46	Chemicals

Notes: This table shows the ten U.S. firms which have conducted the most investigations in Germany. U.S. firms have been merged to investigation reports based on the investigator list. 'Location' gives the states where the firms' investigators are based at. 'Number' gives the total number of investigations. The start date of the first investigation is given in 'First' and the finishing date of the last investigation is given in 'Last'. The industry is given as the category from the topic list which was most often assigned to a report written by an employee of each firm. The full name of the U.S. firm at position seven is Newport News Shipbuilding & Dry Dock Company. 'M. Engineering' is Mechanical Engineering and 'Timber' is Timber, Pulp and Paper.

two firms focused on the mechanical engineering industry, one on the timber, pulp, and paper industry, and one on the armaments industry. All ten firms started their investigations early in mid-1945 and mostly finished in the same year. Only one of the ten firms was still conducting investigations in 1947. In contrast, three firms finished their investigations within just three months.

5 Discussion and Conclusion

In this paper, we present the first systematic and quantitative analysis of the intellectual reparations program faced by the German industry in the aftermath of WWII. We assemble a novel database covering more than 90% of the reports on British and U.S. investigations of German firms. We then present a series of facts on the regional, industrial, and technological breadth of this unprecedented program. Our findings contribute to a broader literature on both the German economic miracle and the emergence of the United States as the world's leading economic power after WWII.

A further contribution of our newly assembled database lies in observing which U.S. firms were involved in the investigations. By linking the investigated German firms to the investigating U.S. firms, we can observe and analyse the resulting knowledge

transfers. In further work, we can examine the effects of access to German technological know-how on industrial performance and innovation in the United States. For example, using balance sheet data on U.S. firms, we can study the effects of the investigations on the performance of participating firms. Alternatively, using patent data we can investigate the effects of the knowledge transfers on follow-on innovation in the United States and thereby examine the long-run effect of the intellectual reparations on U.S. innovation.

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Appendix

A Sources of Historical Data

Reports: We digitise the whole stock of FIAT, BIOS, and CIOS final reports from the archives of the Deutsche Museum in Munich and the Imperial War Museum in London.

Investigator List: We source and digitise the information on the names of the investigators and their employers from a report by the Department of Commerce from 1947 ('Reports resulting from the investigation of German technology, 1945-1946, and index of personnel'). The document is available at the library of UC Berkeley (call number: T26.G3.U5.).

Topic List: We source and digitise the information on the topics of each of the FIAT, BIOS, and CIOS published final reports from the 'Reports on German and Japanese Industry - Classified Lists No. 18-20' by the H.M. Stationary Office from 1948 to 1951. The documents are available in the Rare Books section of the University of Cambridge library (catalogue number: OPR.2.67).

Target List: We source and digitise the information on the target list from the 'Economic Survey' and 'Zone handbooks' of Germany by the Foreign Office and the Ministry of Economic Warfare from 1945. The documents are available at the Imperial War Museum in London and offer a subject index and complete index of firms (catalogue number: LBY 28768-13).

Sources for Figures:

- Figure 1: Deutsches Museum, München, Archiv, CD 91638
- Figure 3a: Deutsches Museum, München, Archiv, CD 91634
- Figure 3b: Deutsches Museum, München, Archiv, CD 91640
- Figure 3c: Deutsches Museum, München, Archiv, CD 91639
- Figure 4a: Deutsches Museum, München, Archiv, CD 91635
- Figure 4b: Deutsches Museum, München, Archiv, CD 91636
- Figure 4c: Deutsches Museum, München, Archiv, CD 91637
- Figure B.1: Deutsches Museum, München, Archiv, CD 91633

B Additional Figures and Tables

Figure B.1: BIOS INVESTIGATION TEAM, SUMMER 1945



Notes: This figure shows members of the investigation team from BIOS report 300 on the German automotive industry. Investigations took place from 24 June to 1 October 1945. The report with 130 pages includes 78 investigations at firms such as BMW, Daimler Benz, M.A.N., Maybach, Opel, Porsche, Volkswagen, and Zahnradfabrik. 24 investigators and 7 liaison officers split into seven teams. The 24 investigators all came from private British industry such as Rolls Royce and Vauxhall. The names and private-sector employers of the members from the depicted 'Team C' are V.W. Pilkington (Leyland Motors Ltd.), F. Grimshaw (Leyland Motors Ltd.), G.J. Rackham (Associated Equipment Co. Ltd.), and Captain T.H.P. Cain. All wore military uniforms. The picture has been provided by the Deutsche Museum in Munich - for details see Appendix A.

Table B.1: DETAILS ON EXEMPLARY TRAVEL ROUTE — CIOS REPORT XXXIII-50

Number	Location	Firm	Date
1	Heinsberg	Vereinigte Glanzstoff-Fabriken AG	16.8.1945
2	Krefeld	Joh. Kleinewefers Söhne	16.8.1945
2	Krefeld	Rheinische Kunstseide AG	15.8.1945
2	Krefeld	Rheinische Zellwolle AG	15.8.1945
3	Hilden	Kampf & Spindler	14.8.1945
4	Dormagen	I.G. Farbenindustrie AG	10.8.1945-16.8.1945
5	Köln	Glanzstoff-Courtaulds	15.8.1945
6	Leverkusen	I.G. Farbenindustrie AG	10.8.1945-11.8.1945
7	Wuppertal	I.G. Farbenindustrie AG	13.8.1945
8	Siegburg	Rheinische Zellwolle AG	17.8.1945; 21.8.1945
9	Bielefeld	Hermann Windel GmbH	9.8.1945
9	Bielefeld	Seydel Maschinenfabrik GmbH	9.8.1945
10	Bad Oeynhausen	C.A. Delius & Söhne	7.8.1945
11	Hannover	Döhren Wollwäscherei und -kämmerei	8.8.1945
11	Hannover	Continental Gummiwerke	10.8.1945-11.8.1945
12	Berlin	Spinnfaser AG	30.8.1945
12	Berlin	KWI für Physikalische Chemie	29.8.1945
13	Südliches Anhalt	Eilfeld AG	2.7.1945
14	Bitterfeld-Wolfen	I.G. Farbenindustrie AG	27.6.1945; 28.8.1945-1.7.1945
15	Leuna	I.G. Farbenindustrie AG	2.7.1945; 25.8.1945
16	Elsterberg	Vereinigte Glanzstoff-Fabriken AG	2.7.1945
17	Plauen	Sächsische Zellwolle AG	2.7.1945
18	Schwarza	Thüringische Zellwolle AG	2.7.1945-3.7.1945
19	Kassel	Spinnfaser AG	3.7.1945
20	Rosenthal	I.G. Farbenindustrie AG	15.8.1945
21	Fulda	Val. Mehler Segeltuchweberei AG	22.8.1945
22	Wiesbaden	I.G. Farbenindustrie AG (Kalle & Co.)	4.8.1945
23	Kelsterbach	Vereinigte Glanzstoff-Fabriken AG	5.9.1945
24	Frankfurt am Main	IG Farben	3.8.1945-4.8.1945; 17.8.1945
25	Hanau	Condux-Werk (Herbert A. Merges KG)	25.9.1945
25	Hanau	W.C. Heraeus GmbH	6.9.1945
26	Obernburg a.Main	Vereinigte Glanzstoff-Fabriken AG	1.9.1945-2.9.1945
27	Ludwigshafen	I.G. Farbenindustrie AG	4.8.1945; 21.8.1945-25.8.1945
28	Stuttgart	Werner & Pfleiderer	30.8.1945
28	Stuttgart	Maschinenfabrik Gg. Kiefer GmbH	30.8.1945
29	Esslingen am Neckar	Fritz Müller Pressenfabrik	29.8.1945
30	Denkendorf	Zellwoll-Lehrspinnerei	31.8.1945
31	Rottweil	I.G. Farbenindustrie AG	28.8.1945
32	Freiburg	Rhodiaseta AG	20.9.1945
33	Waldshut-Tiengen	Lonza-Werk	19.8.1945
34	Bad Säckingen	Lonzana AG für Acetatprodukte	19.8.1945
35	Bobingen	I.G. Farbenindustrie AG	26.7.1945-30.7.1945
36	Augsburg	Augsburger Kammgarn-Spinnerei	27.7.1945
37	Kelheim	Süddeutsche Zellwolle AG	28.7.1945
38	München	Agfa Camerawerke (I.G. Farben)	8.7.1945-9.7.1945; 28.7.1945
39	Burgkirchen a.d.Alz	I.G. Farbenindustrie AG	10.7.1945-11.7.1945; 13.7.1945
40	Burghausen	Dr. Alexander Wacker GmbH	2.7.1945; 12.7.1945; 17.7.1945; 1.8.1945-3.8.1945

Notes: This table lists all locations, firms, and dates of the investigations shown in Figure 2.

Figure B.2: WORD CLOUD: TITLES OF REPORTS



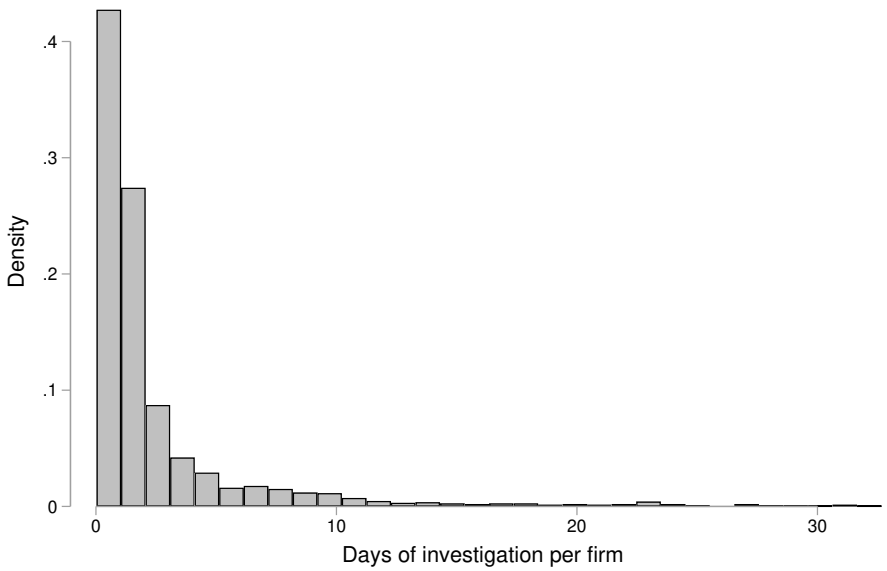
Notes: This figure shows a word cloud of the words which have most often been used in the title of BIOS, CIOS, and FIAT reports. Larger font size implies that a word has been used more often.

Table B.2: COMPARISON: OUR DATASET VS. UNIVERSE OF REPORTS

		CIOS	BIOS	FIAT	Total
Published	In Dataset	573	1,463	687	2,723
	Maximum	574	1,465	687	2,726
	Share (in %)	100	100	100	100
Not Published	In Dataset	401	293	456	1,150
	Maximum	532	436	653	1,621
	Share (in %)	75	67	70	71
Total	In Dataset	974	1,756	1,143	3,873
	Maximum	1,106	1,901	1,340	4,347
	Share (in %)	88	92	85	89

Notes: This table compares the number of reports in our dataset with the maximum number of potentially written reports. The maximum number is taken from the report with the highest numerical value. The calculated share is a lower bound. For example, a report may be missing if two reports were merged and published under one number only. The information whether a report has been published was taken from the topic list.

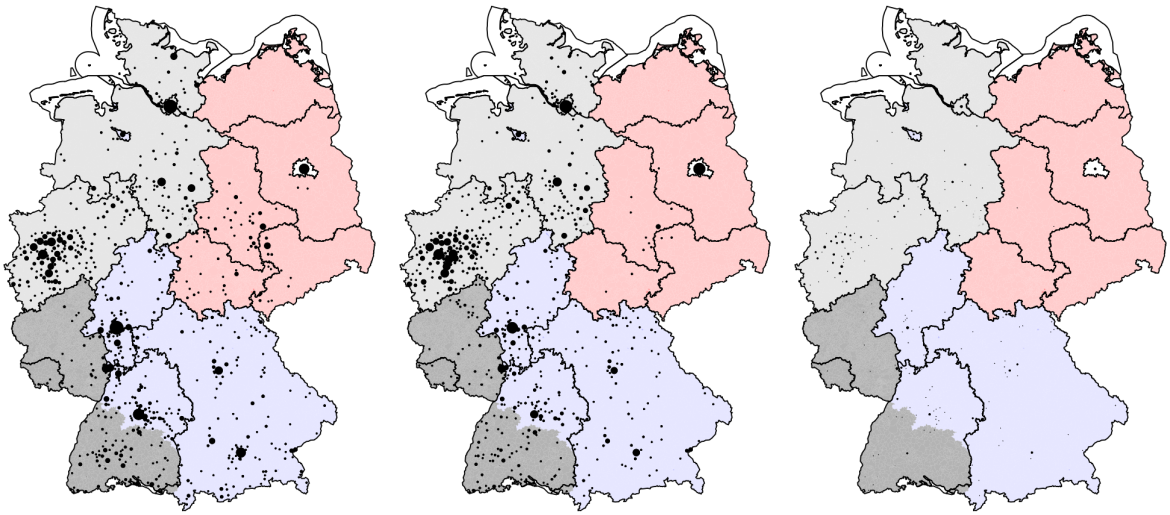
Figure B.3: TIME SPENT ON INVESTIGATIONS



Notes: This figure shows the distribution of days that were spent investigating an individual firm. The date of investigation is available for close to 50% of investigations, implying that only a subset of all investigations can be employed for this analysis.

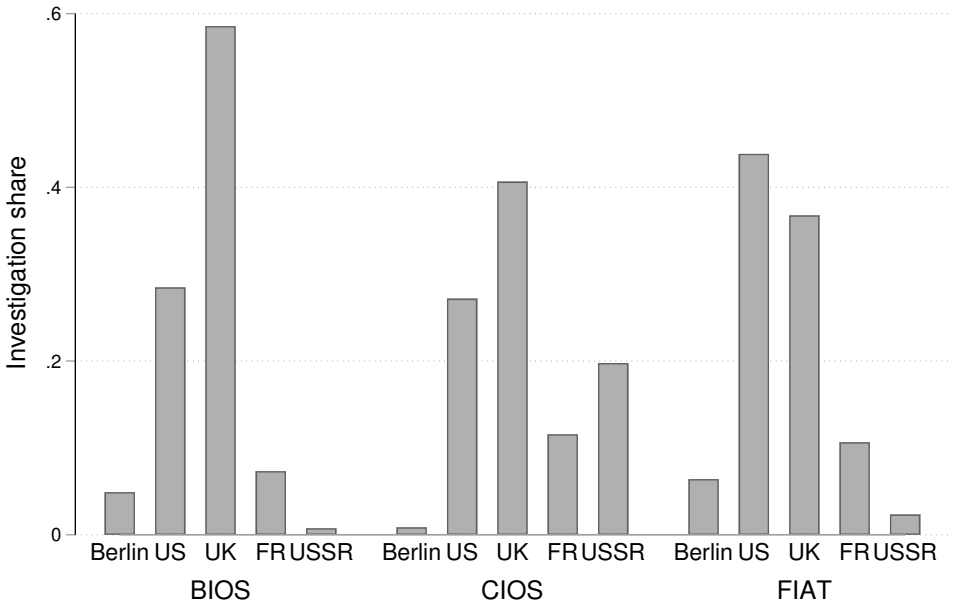
Figure B.4: LOCATION OF INVESTIGATIONS BY YEAR

(a) 1945 (b) 1946 (c) 1947



Notes: This figure shows the location of investigations for each year of the program. The size of the black dots is proportional to the number of investigations in each municipality. The scale is similar for all three sub-figures. The date of investigation is available for close to 50% of investigations, implying that only a subset of the investigations from Figure 11 is shown here. Germany was divided into four occupation zones: Blue is the U.S. zone, light grey is the British zone, dark grey is the French zone, and red is the Soviet zone. The zone borders are based on a map by Kunz (2004). Investigations are extracted from the reports of BIOS, CIOS, and FIAT which include British and U.S. investigators, but not French or Soviet ones. The maps are based on German borders as well as the municipality and state structure from 2023.

Figure B.5: LOCATION OF INVESTIGATIONS BY ZONE



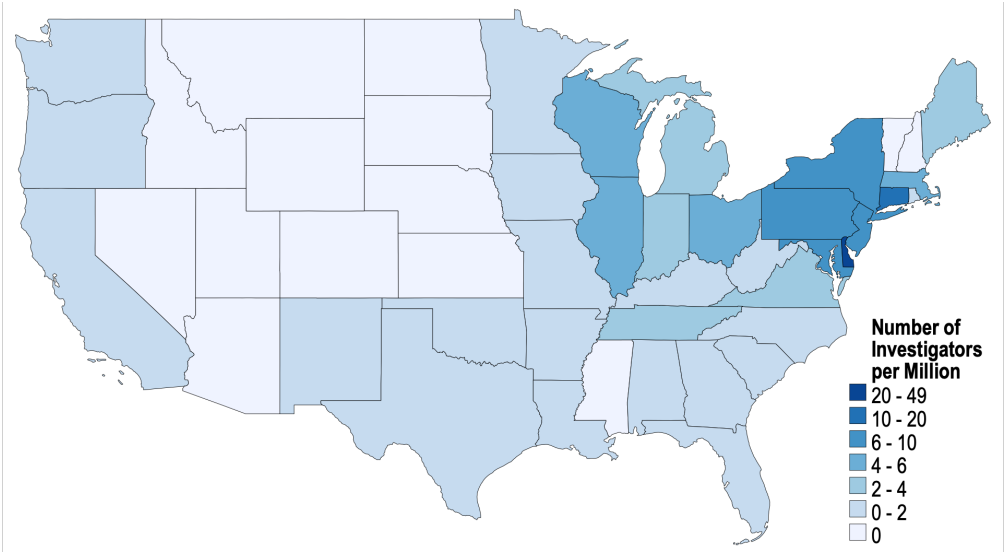
Notes: This figure shows the share of investigations occurring in each zone and Berlin separately for BIOS, CIOS, and FIAT. The assigning of municipalities to occupational zones is based on a map by Kunz (2004).

Table B.3: TOP 10 STATES BY NUMBER OF INVESTIGATORS

	State	Investigators	Inhabitants
1	New York	102	13,479,142
2	Pennsylvania	61	9,900,180
3	Washington D.C.	42	663,091
4	Ohio	37	6,907,612
5	Illinois	33	7,897,241
6	New Jersey	30	4,160,165
7	Connecticut	23	1,709,242
8	Massachusetts	19	4,316,721
8	Michigan	19	5,256,106
10	Wisconsin	18	3,137,587

Notes: This table shows the top ten U.S. states by the number of investigators sent to Germany. The information on the location of investigators is drawn from the investigator list. The number of inhabitants is for the year 1940 and it is taken from U.S. Bureau of the Census (1950).

Figure B.6: NUMBER OF INVESTIGATORS PER INHABITANTS BY STATE



Notes: This figure shows the number of investigators from each U.S. state per one million inhabitants. The information on the location of investigators is drawn from the investigator list. The number of inhabitants is for the year 1940 and it is taken from U.S. Bureau of the Census (1950).