

De-coding the image of the firm: secret reserves and internal financing in the German chemical industry, c. 1890–1916

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This article uses the leading firms of the German chemical industry as a case study to provide a detailed example of how companies in the late nineteenth and early twentieth century used internal financing as an instrument of corporate finance. It traces the at first diverse significance of internal financing for the industry and identifies two moments of market concentration that triggered a convergence of corporate finance by a harmonisation of accounting standards that were not predefined by legal frameworks. The article argues that secret reserves and further ways of internal financing were key components of this harmonisation. The industry-wide creation of secret reserves cloaked the companies' actual financial strength from outsiders who were merely left with an image of the respective firms that was carefully drafted by companies' managers.

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I

The relation between inside and outside actors and their respective knowledge is a fundamental condition of stock market exchange. Even though recent research has emphasised the importance of individual expectation formation and emotions as a driving force behind stock market trading and the valuation of firms, information and its asymmetric distribution remain at the heart of investment decisions (Akerlof and Shiller 2009; Shiller 2017, 2019). The public information provided by companies in financial statements such as balance sheets and profit and loss accounts is integral to

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these decision-making processes, where financial ratios such as price–earnings ratios or price–to–book ratios are commonly used for valuing companies and investment opportunities. This information made available by companies, however, in most cases only displays a carefully shaped image of the firms. Accounting provides companies with several means by which to influence the numbers communicated to the public. This influence makes the accurate assessment of a firm’s value difficult and information that goes beyond common knowledge becomes a demanded and precious good.

Historically, companies possessed several instruments to influence their financial reporting. This scope of action benefitted from fragmented legal regulation. In the second half of the nineteenth century, German (Eierle 2005), British (Edwards and Webb 1982, p. 272) and French commercial law (Lemarchand 1993), for instance, only obliged joint stock corporations to provide shareholders with balance sheets and profit and loss statements, whereas the valuation of assets – the ‘vital question in all accounting’ – received little attention (Hatfield 1966, p. 175). The weak financial stability and the lack of checks and balances of joint stock companies was regarded as one of the main reasons for the 1870s economic crisis and the legislators’ focus was therefore set on designing a legal framework that would lead to a more sustainable corporate governance. In Germany, the 1870 amendment of the *Allgemeines Deutsches Handelsgesetzbuch* (ADHGB), the German commercial code first published in 1861, made a supervisory board (*Aufsichtsrat*) mandatory for the first time (Gietzmann and Quick 1998, p. 87). Another legislative goal was to make accounting more sustainable, mainly by preventing companies from overstating their assets (Gallhofer and Haslam 1991, p. 496). In contrast, the *understatement* of assets was not regulated and companies in the countries named above began to develop different methods to decrease the book value of their assets, most prominently by depreciation. These methods led to a transfer of profits into secret reserve funds and the establishment of internal financing as an important source of corporate finance, that in some cases became even more important than equity financing and debt financing (Lemarchand 1993, p. 304; Steinfeld 2021).

Innovative industries of the so-called Second Industrial Revolution (Chandler 1994, pp. 25–6) provided suitable environments for the creation of secret reserves, as fixed assets were often quickly outdated due to scientific progress and change of production paradigms, resulting in high depreciation rates. As will be shown in this article, the *Farbenfabriken Bayer* (today’s Bayer AG), one of the most important companies of the German chemical industry, developed sophisticated means of internal financing that were strongly linked to the company’s secret reserve policy. Between 1890 and World War I, Bayer became dominant in the German chemical industry not only by developing innovative products, but also by establishing superior accounting practices compared to the company’s main competitors. Using Bayer as a case study, it will be shown that companies operating at the turn of the century possessed several means to influence their financial statements. This influence found its expression in vast dividend and profit smoothing and enabled Bayer to tap internal

financing as a new stream of funding alongside the already well-established equity and debt financing. At Bayer, internal financing developed into the most important source of capital during the late nineteenth century.

The second aim of this article is to illustrate the ability of companies to influence and manipulate the information flow to the public such as investors and shareholders. As will be shown, secret reserves led to a large scope for decision-making regarding the information that was made public by companies. The article's arguments are then discussed based on a comparison of reserves from eight German chemical companies, namely the dominant firms BASF, Bayer and Hoechst, and the smaller companies AGFA, Cassella, Kalle, Griesheim-Elektron and Weiler-ter Meer. In 1916, these companies formed the so-called *Interessengemeinschaft*, a syndicate in which the production and profits were pooled and organised by quotas. The negotiations of the quotas required a disclosure of the companies' total assets, including hidden assets such as provisions and secret reserves. This disclosure of balance sheets provides us with a unique source on the extent of internal financing for the most important players of an entire industry and delivers specific information on the development of secret reserves that is otherwise hard to trace, especially for multiple companies at once (Marriner 1980). Before proceeding to an examination of these reserve practices, the article sketches the history and concentration process of the German chemical industry until the *Interessengemeinschaft* negotiations in 1916 with a focus on the company Bayer. The following section then provides a detailed analysis on the reserve practices for different companies of the *Dreibund* and *Interessengemeinschaft*.

II

At the beginning of the twentieth century, most companies of the German chemical industry had reached the preliminary peak of their profitability. The three major players BASF, Bayer and Hoechst were founded in the 1860s and began as producers of synthetic dyestuffs based on coal tar derivatives (Haber 1958). As natural dyestuffs were expensive and their production was often carried out in several steps and relied on international supply chains, the synthetisation of these dyes using relatively cheap chemicals led to very high profit margins for the young chemical industry (Nieto-Galan 2001, p. 222). The companies expanded their portfolios during the 1880s when further experiments with coal tar derivatives proved that even pharmaceuticals could be produced using carbon compounds. Even though BASF, Bayer and Hoechst had obvious similarities when it came to the product portfolio, the companies established diverging strategic foci from the 1880s at latest. From the mid 1880s onwards, BASF invested heavily in research on a synthetic process for indigo dye, the most demanded natural dyestuff at the time (Engel 2012, p. 16). The synthetic dyestuff was eventually brought to the market in 1897 and became a commercial success (Engel 2009, p. 109).

While BASF's strategic focus was set on the development of few but highly profitable products, Bayer's initial success was based on efficient and streamlined

production rather than on innovation. Until the mid 1880s, the company had barely invested in research and pursued a strategy that has fittingly been described as ‘copy, improve and make it cheap’ (Murmah 2003, p. 109). By executing this strategy, Bayer had been able to gain a considerable market share in synthetic dyestuffs. When the first comprehensive patent law in the German empire was established in 1877, Bayer’s to that point successful strategy of maximising profit margins was quickly threatened (Streb *et al.* 2007). The company was forced to adapt and started investing in its own research departments and began to hire university-trained chemists. Bayer now no longer relied on single products, but rather on a diversified portfolio that, for instance, included pharmaceuticals – a category of products that BASF did not pursue (Plumpe 2016b, p. 157).

The adjustment of corporate strategy was, however, not quickly achieved. The slow adjustment displayed by the Bayer management was certainly influenced by the company’s shareholder structure. Even though the company had been turned into a limited partnership in 1881 and then into a joint stock company in 1883, about 80 per cent of the company’s shares were held by members of the founding families by the end of the 1880s. The dominating policy during the first decades of the company’s existence was to distribute as many profits as possible to the shareholders, a strategy that practically prevented reinvestments in the firm. The lack of investments in its own research capabilities can be seen as an immediate consequence of this policy. Another implication of the company’s dividend policy was the lack of financial protective measures such as provisions and reserves. Only in 1885, when the company faced severe economic challenges due to its late adaptation to research and development, did the Bayer management depart from its dividend policy and begin to transfer earnings into reserve accounts.

At this time, the scope for action for the Bayer management was very limited. Investment in research was costly and did not promise immediate success. The company executives instead focused on rationalising the firm using cost-cutting measures, eventually putting the potential which accounting offered into the spotlight. By switching its focus to the internal efficiency of the company, Bayer acted in line with what was later described as one of the central moments of company transformation from ‘family business’ to ‘big businesses’ and the refinement of accounting practices that goes hand in hand (Kocka 1969; Johnson and Kaplan 1987; Chandler 1962; Colli *et al.* 2011).

The increasing amount of quantitative information not only made it possible to record internal processes in detail, but also led to innovative balancing practices. Towards the end of the 1880s, the Bayer management began to understand how it could make use of accounting practices to influence the company’s financial reporting. This link between the sophisticated accounting practices and innovations in financial reporting was most distinctly expressed in the company’s reserve policy. This policy had initially been influenced by the first major regulation of the German commercial code since 1870. In 1884, the lawmaker obliged stock corporations to create public reserves. For this purpose, 5 per cent of the net profit had to be transferred annually to a statutory reserve fund until the amount of the fund reached 10 per cent of the company’s share capital. The law

also determined that stock companies should use the reserve fund exclusively to avert corporate losses and it was not available to be distributed to shareholders as dividends.¹ As a result of these restrictions, many companies set up an additional voluntary reserve fund, the allocation and use of which they themselves could determine.

In contrast to its direct competitors, Bayer struggled to meet the legal requirements. While the public reserves of BASF already complied with the legal requirement in 1885, Bayer was only able to allocate funds to the reserve fund from 1887 onwards due to the economic trouble the company had faced. The funds in the reserve fund had partly been generated by increases in share capital, which led to a wider distribution of the company's holdings to shareholders outside the founding families. Even though the number of shares held by outsiders to the company was relatively small and most likely did not exceed 25 per cent, the increase in equity meant a turning point in the way the company treated its finances. While BASF assigned most of its reserves directly to the voluntary reserve fund whose amount was published in the company's balance sheet, Bayer's management in 1887 began with the practice of 'special depreciation'. These depreciations primarily served to create secret reserves, a process that was perceived by management as equivalent to the creation of public reserves. The special depreciation had to be approved by the shareholders' meeting, as it was deducted directly from the company's annual profit. Here, the supervisory board repeatedly justified the special depreciation as being necessary for 'strengthening the working capital'.²

Even though the secret reserves in theory could be directly calculated by outsiders by totalling the special depreciation accounts, the lack of secrecy did not pose an obstacle to the company's management. This was for two reasons. On the one hand, in the contemporary perception, secret reserves were in any case regarded as an 'expression of solid management' and as a legitimate means of financing a company and were therefore little criticised (Spoerer 1998, p. 354; also Spoerer 1996, p. 67; Parker 1991, p. 13). On the other hand, since the second half of the 1880s, the company's management had repeatedly stated that it would prefer to delay a capital increase for as long as possible.³ The solution was to move to internal financing by forming secret reserves. This was desirable for the company's management as part of the dividend payment could be dispensed. The payment of dividends would sooner or later have made a capital increase necessary, especially since the German commercial law put a special focus on the balance sheet as an indicator of the amount of profit available for dividend (Hatfield 1966, p. 173). Therefore, in bypassing the payment of dividends by placing a part of the net profits into secret reserves, the Bayer management was able to postpone further capital increases (Spoerer 1995, p. 161). After a capital increase from 7.5 to 9 million marks in 1889, the share capital remained unchanged

¹ Allgemeines Deutsches Handelsgesetzbuch, Artikel 185b. Version from 18 July 1884.

² See BAL Annual Reports between 1886 and 1890.

³ See, for instance, BAL Annual Report 1887.

until 1896 when an increase in capital to 12 million marks was approved by the general assembly.⁴

The company's restraint from enlarging the share capital was partly made possible by an increase in debt capital, at least in periods of high financial demand. In these periods, the Bayer management used both bank loans and corporate bonds as financial sources. Even though the company used both sources, the management had a preference for bond financing as it tried to minimise the risk of potential bank interference in the company's day-to-day business. In view of the active involvement of the German 'universal banks' that has been observed for several German industrial companies, the influence of banks on Bayer's corporate governance and strategic decision-making was apparently very limited (Gietzmann and Quick 1998, p. 84; a nuanced discussion in Burhop 2006b).

Bayer's capability to refrain from repeated and huge increases in share capital was based on further, comparatively innovative accounting strategies. Since 1891, the executive board had begun to transfer profits into reserve accounts even before the balance sheet was presented at the shareholders' meetings. The purpose of these reserves was not communicated to the public and even the tax authorities did not know about the massive balance sheet contractions conducted by Bayer management. In this process, the balance sheet values were first reduced and then further depreciated using regular depreciation and the instrument of special depreciation.

As a result of this balance sheet policy, the Bayer management was able to shape the company's net profits as needed. Instead of a fluctuation that would have corresponded to the actual sales development of the company, the company in its financial statements noted constantly increasing earnings (see Figure 1). In the years 1898 and 1903, for example, the company reported increasing profits, even though they in fact declined. The Bayer management perceived the legal requirement to present a financial statement as a burden rather than a necessity. Carl Duisberg, who later became CEO of the company, stated in 1903: 'Wir machen am Ende des Jahres unsere öffentliche Bilanz auf, wie es uns passt; wir verteilen Dividende nach unserem Ermessen ... [At the end of the year, we define our public balance as we please; we distribute dividends at our discretion ...]' (Plumpe 2016a, p. 245). By controlling the flow of information, the Bayer management at the same time controlled the knowledge of its shareholders and shaped the image of their firm to their judgement (Burhop 2006a, p. 4).

Besides the decisive influence the management would, in general, wield on the numbers released, Duisberg pointed out the important effect the manipulation of the balance sheet had on dividend payments to shareholders. One implication of the 1889 increase in capital was that a larger proportion of company shares was now owned by passive shareholders, namely persons who were not actively involved in the day-to-day decision-making processes. Around 1890, the Bayer management

⁴ BAL Annual Reports 1897–1903.

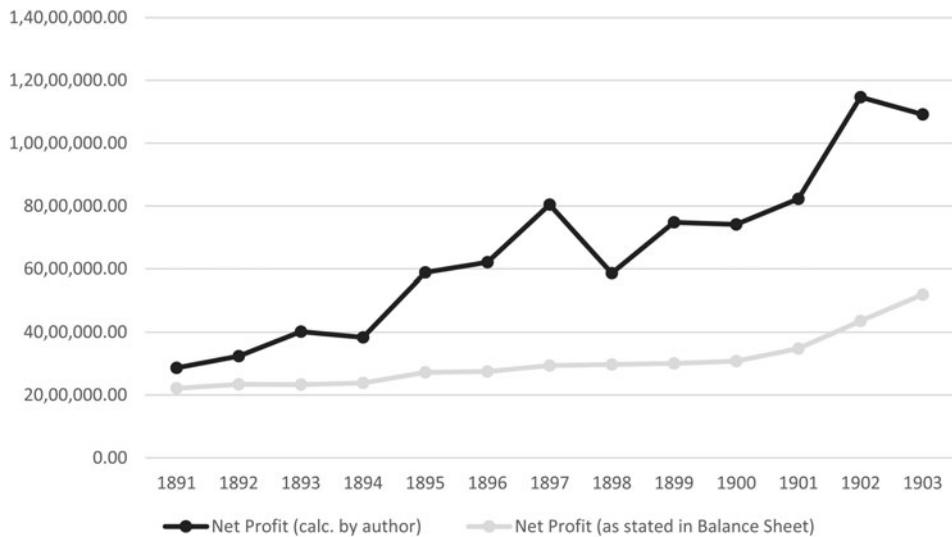


Figure 1. *Development of Bayer's net profits. Numbers from annual reports vs calculated numbers including balance sheet contraction, 1891–1903*

Source: Official numbers taken from the respective annual reports, BAL Annual Reports 1891–1903. Balance sheet contraction numbers calculated from the individual balance discussions between the executive board and supervisory board, BAL 11/3, Minutes of the Supervisory Board.

deemed it necessary to stabilise the dividend payments by using depreciation as the central tool to influence the earnings reported – a strategy that has also been identified in the British coal industry before World War I (Pitts 1998, pp. 39–40). While the 1884 revision of the German commercial code targeted depreciation and at least obliged companies to depreciate their assets, the rate or duration of depreciation was not specified (Hatfield 1966, p. 177). During the 1890s, the Bayer management hence adjusted the depreciation rates according to the company's economic growth. In the successful year 1895, for instance, the depreciation rate on buildings was increased from 9 to 16 per cent, while the depreciation on machinery was raised from 25 to 30 per cent. A similar increase can be identified in 1897.⁵ As the company executives were able to smooth the yearly earnings published (again, Figure 1, light grey line), they at the same time controlled the dividends the company had to pay. Paralleling the officially almost barely increasing profits, Bayer paid a constant 18 per cent in dividends between 1891 and 1900.

It is noteworthy that even the Prussian income tax reform of 1891/93 apparently did not provide any incentives to standardise accounting practices. Although the tax reforms initiated by Prussian minister of finance Johannes von Miquel introduced

⁵ BAL 10/1.2, Statistik: Stand der Fabriken.

a tax base for stock corporations for the first time, this was based exclusively on published balance sheets and income statements (Mathiak 2011, p. 191). Thus, the tax base was easily influenced by the companies' accounting margins resulting from depreciation rates. Although it was possible for the tax authorities to request inventories or to inspect accounting records, this option was not increasingly used until the interwar period. The reason for this passivity on the part of the tax authorities may have been that the accounting and financial reporting practices of companies were to a certain extent knowledge that was probably difficult for external auditors to fathom (Mathiak 2011, pp. 136–7). The problems that arose from this asymmetric information between companies and auditors were only slowly tackled and led to the establishment of audit firms around the shift to the twentieth century (Gietzmann and Quick 1998, p. 88).

III

The beginning of the twentieth century was perceived as the peak of profitability by the leading firms of the chemical industry. The race for a synthetic process for indigo dye came to an end when BASF and Hoechst both brought their products to market in 1897 and 1901, respectively (Hippel 2003, p. 57). For most of the other synthetic dyestuffs, the initial high profit margins had declined over time due to increasing competition. In the nineteenth century, the companies' main business had revolved around the chemical reproduction of important natural dyes. When successful, the discovery promised short-term monopoly profits that were protected by German patent law (Seckelmann 2006). Now, at the beginning of the twentieth century, the business had switched to making the existing production of dyestuffs as efficient as possible. Even though the chemical companies continued to diversify their portfolios by including categories such as photographic products, their dependence on the dyestuff business combined with decreasing profits was perceived as more and more threatening.

In reaction to the increasingly worrisome situation, the executives from BASF, Bayer and Hoechst met several times in 1903 to discuss the possibilities of a merger. Hoechst soon indicated that its interest in a merger was very limited, and instead in 1904 announced collaboration with the smaller chemical company Leopold Cassella & Co. that was based on mutual equity stakes. In 1906, another relatively small player, the Chemische Fabrik Kalle, was added to the company alliance that received the name Dreiverband. Hoechst's single-handed action gave BASF and Bayer a new impetus to negotiate, especially as BASF feared to lose its competitiveness in the production of synthetic indigo. Still in 1904, the much smaller chemical company AGFA was included to the syndicate that was named Dreibund. The profit pool was arranged accordingly, BASF and Bayer received 43 per cent of the profits each, while 14 per cent were left to AGFA.⁶ The establishment of the

⁶ BAL 4/A.11, IG: Verträge über die geschlossene Interessengemeinschaft der deutschen Teerfarbenfabriken.

Dreibund and Dreiverband implied that since 1906 major parts of the German chemical industry were divided into two competing alliances.

When entering the negotiations about the syndicate in 1903, BASF displayed the self-perception of being the by far most successful company within the entire industry – a perception that the company's balance sheet also suggested. While BASF's public balance sheet for 1903 totalled about 78 million Marks, that for Bayer displayed assets just under 47 million Marks (see [Table 1](#)). The crucial challenge within the negotiations was to find common ground for the comparison of the individual companies' assets.

As has been shown, the companies possessed wide scope when it came to instruments essential for company evaluation such as depreciation, most importantly. As the companies' executives were aware of this lack of standardisation, they agreed to recalculate all their assets from 1881 onwards using consistent valuations and depreciation rates. On the practical accounting level, the detailed comparison of assets was achieved by an entire revaluation using consistent rates of depreciation from 1881 onwards. Equipment and machinery were depreciated at a rate 10 per cent p.a., property at a rate of 5 per cent p.a. The framework and guidelines for the standardisation of the balance sheets were quickly accepted by the BASF leadership as the knowledge of Bayer's executives and accountants was recognised as superior. Indeed, the negotiations even revealed that BASF's accounting practices were rudimentary at best. The BASF executives and accountants had little to no knowledge of the actual production costs of their products and, as it turned out, several departments charged overhead costs multiple times.

The very different levels of sophistication the companies displayed with regard to their accounting can be linked to the general state of accounting knowledge of that time. As both contemporary and current research suggest for the late nineteenth century, accounting literature was mainly produced by practitioners who described problems within their companies and tried to generalise their best-practice solutions. An institutionalised scientific examination of the problems of accounting, on the other hand, can only be observed with the founding of the first German business schools around 1900 (Fear and Kobrak 2006, pp. 21–2). Consequently, the development of accounting could not be guided by an institution-driven discourse in those companies whose origin or essential growth phase fell within the period of the Second Industrial Revolution. This is true for a large number of important companies in the German chemical industry, such as Bayer, BASF or Hoechst, but also for the majority of companies in the coal and steel industry (Lindenlaub 2006). It can therefore be assumed that management accounting in these companies had to develop largely independently and therefore in different ways, since, in addition to the lack of institutional framing by universities, there was also a far-reaching legal vacuum, the filling of which did not contribute to a standardisation of management accounting or its valuation bases until the end of the century.

When Bayer and BASF disclosed their balance sheets to one another, including the secret reserves and according to the agreed recalculation, the picture changed entirely.

Table 1. *Asset evaluation in official and Dreibund balance for the fiscal year 1903 (in Marks)*

1903	BASF		Bayer	
	Official balance sheet	Dreibund balance sheet (incl. secret reserves)	Official balance sheet	Dreibund balance sheet (incl. secret reserves)
Total fixed assets	31,085,293.47	42,357,767.14	9,894,376.36	38,939,539.74
Total current assets	47,011,517.14	51,190,979.16	36,968,072.47	55,914,258.01
Total assets	78,096,810.61	93,548,746.30	46,862,448.83	94,853,797.75

Numbers taken from BAL 4/A.11, IG: Verträge über die geschlossene Interessengemeinschaft der deutschen Teerfarben Fabriken.

Taking the secret reserves into account, Bayer had a balance sheet total of 94.5 million Marks, making the company twice as valuable as stated on the official financial statement and as assumed by BASF. Although the inclusion of secret reserves also increased BASF's balance sheet total, it only amounted to 93.5 million Marks. As BASF also had accumulated secret reserves in the amount of almost 20 per cent of the company's total assets, the fact that Bayer had transferred profits into secret reserves should not have surprised the BASF management. What it apparently did not anticipate was, however, how *much* Bayer had been able to withdraw from its earnings. After a heated debate, BASF eventually acknowledged Bayer's financial power and accepted it as a peer. Even though Bayer was technically the bigger firm and should thus have received a bigger share of the profit pool, both companies received the same quotas in the final agreement. However, BASF had to compensate Bayer for its bad productivity and for the period of five years had to transfer some of its earnings to its competitor (Duisberg 1918). Also, the first years of the Dreibund saw a transfer of accounting knowledge from Bayer to BASF, both by accounting frameworks being adopted by BASF as well as by Bayer accounting personnel joining the BASF accounting divisions.

The equality Bayer received despite the big gap in the official book values apparently did not, however, lead to a discussion about Bayer's true valuation in the media, even though the surprising division of shares was, indeed, mentioned. One of the major news outlets of the time, the *Berliner Börsen-Zeitung*, noted in an article about AGFA joining the Dreibund that one of AGFA's shareholders had criticised the company only receiving 14 per cent of the syndicate's profit pool. The shareholder demanded a higher degree of transparency regarding the calculation of the profit pool and stated that the only explanation he could think of was that the companies did not distribute what they could have distributed, meaning that they had cut dividends and strengthened their financials instead.⁷ The quote indicates that the anonymous shareholder was referring to the Dreibund companies smoothing dividends and possibly

⁷ *Berliner Börsen-Zeitung*, no. 558, 12 December 1904.

also earnings, implying that the smoothing was both a known and common accounting practice, as also suggested by other studies (Parker 1991, p.11).

Around the time of the foundation of the Dreibund, the scope for action of Bayer's management in respect to possible balance manipulation diminished. The reason for this decrease was technical: as mentioned before, Bayer's large secret reserves were mainly brought about by the heavy depreciation of fixed assets. By the beginning of the 1900s, however, most of the company's assets such as buildings and machinery had been entirely written off, resulting in so-called '*Erinnerungsposten*' (reminder post/assets) that appeared in the books with the total amount of one Mark. With the decreasing possibilities for depreciation, Bayer lost its most important instrument to influence and adjust the company's official yearly earnings and dividend payments. In consequence, the company's profit – which according to the published balance sheets had barely moved during the entire decade of the 1890s – almost doubled between 1900 and 1902 (see, again, Figure 1). Within its yearly financial statements, the Bayer management argued that the rapid increase in profits resulted from a strong rise in demand for the company's products as well as from the efficiency of the company's production flows. The existence of secret reserves remained unmentioned.

IV

The industry's division into the Dreiverband and Dreibund lasted until the outbreak of World War I. Despite the importance the industry would gain during the war due to the fabrication of strategic products such as munition, gas masks and – at a later stage – poison gas, the industry's leadership did not perceive the war as an economic opportunity (Plumpe 2016a, p. 443). If anything, the outbreak of the war meant high uncertainty for their businesses, especially since the chemical industry had been traditionally highly dependent on exports to foreign markets: in 1913, almost 82 per cent of the German synthetic dyestuff production had been sold abroad, the export ratio for other business areas also amounted to between 70 and 80 per cent. With Russia, Great Britain and France entering the war, three of the five most important export markets shut down for the German companies within the first weeks (Plumpe 1990, p. 50). At first, the chemical industry was able to compensate for the loss of these export markets by increasing shipments to other regions, especially the US. In total, the German chemical's industry reduction of revenue amounted to just 15 per cent in 1914 (Vollmann 2011, p. 178). What already loomed large was, however, the unforeseeable situation that the chemical companies would face once the war ended. The industry depended on a vulnerable global network of agencies, branches and supplier relations, and a change in this status quo had the potential to threaten the solvency of some of the major companies. The CEO of Bayer, Carl Duisberg, in 1915 described the situation as follows:

The enormous influence of the world war forced upon us and our industry, with its large assets and outstanding accounts in enemy countries, and the factories with large assets there, which

have been placed under sequestration or military supervision several times, can only be assessed after the war. In any case, we will have to anticipate great losses. ... If our factories were united in a large association, the disadvantages resulting from this situation could be distributed equally among all of us, which is now the case only with the companies of the Interessengemeinschaft [Duisberg refers to both the Dreibund and Dreiverband], but even there to a limited extent because of their smallness.⁸

Duisberg made this statement in the light of new negotiations about the establishment of an industry-wide syndicate that had begun in 1915. As stated by Duisberg, the industry's division into the two alliances and the economic stability they offered was not perceived to be enough to absorb the anticipated shock of the aftermath of the war. In January 1916, the Dreibund and Dreiverband companies announced the foundation of the Interessengemeinschaft der deutschen Teerfarbenfabriken (IG) that was modelled on the Dreibund and laid out for 50 years. Instead of the tight Dreiverband structure based on mutual equity stakes, the IG companies chose the looser syndicate structure by pooling their profits. They further followed unified organisational and accounting frameworks, while the companies remained independent from a legal perspective. In August 1916, the IG announced an expansion and added two more companies, the relatively small Chemischen Fabriken vorm. Weiler-ter Meer and the Chemische Fabrik Griesheim-Elektron. Both officially joined the IG on 1 January 1917. Just as Duisberg had hoped, the IG now contained eight of the leading German chemical companies.

The pooling of profits again required a coherent valuation of assets from all companies involved. Again, the yearly increases of all company's assets were depreciated with consistent depreciation rates. Using coherent rates of depreciation, the newly calculated balance sheets showed differences in asset valuation for all the eight IG members, especially due to the existence of secret reserves in all companies.

At every IG company, secret reserves played a far more important role than official reserves (Table 2). Secret reserves amounted to more than two-thirds of the total reserves at every single one of the former Dreibund and Dreiverband companies, while the ratio itself barely varied at the individual companies, suggesting a convergence of accounting practices within the two company alliances. For instance, as was shown in the Dreibund negotiations, the ratio of secret reserves to official reserves between BASF and Bayer differed greatly in 1904, with Bayer's secret reserves even exceeding the company's official book value. Translated into the ratio of secret to total reserves used above, Bayer's secret reserves in 1904 had a share of about 84 per cent, while the secret reserves at BASF just amounted to about 50 per cent of the company's total reserves. Bayer's relative decrease in secret reserves since 1904 was an immediate consequence of the cooperation with BASF and AGFA. In the Dreibund years between 1904 and 1916, the three companies pursued investments into two major projects. In 1906, the Dreibund companies engaged in a joint

⁸ BAL 4/A.4, IG, Denkschrift über die Vereinigung der deutschen Farbenfabriken (author's translation).

Table 2. *List of total, official and secret reserves at the end of the year 1915 of companies BASF, Bayer, AGFA (all former Dreibund), Hoechst, Cassella, Kalle (all former Dreiverband), Griesheim-Elektron and Weiler ter-Meer (new IG members)*

Company	Official reserves	Secret reserves	Specific SR	Total reserves	Ratio secret/total
BASF	41,740,498.82	92,873,680.99	5,763,579.54	140,377,759.35	70%
Bayer	46,895,530.37	115,422,538.93	1,878,914.47	164,196,983.77	71%
AGFA	16,156,768.66	36,638,258.56	4,554,080.56	57,349,107.78	72%
Hoechst	33,245,785.37	68,540,933.37	1,919,031.34	103,705,750.08	68%
Cassella	11,712,114.67	30,052,561.96	—	41,764,676.63	72%
Kalle	—	—	—	—	—
Griesheim-Elektron	15,453,356.70	20,914,145.94	907,643.87	37,275,146.51	59%
Weiler-ter Meer	3,312,694.00	4,711,916.07	—	8,024,610.07	59%

Note. Specific Secret Reserves were individual reserves that were listed separately as they did not exist for all companies. They were not used for the comparison of IG balance sheets. As Hoechst owned the majority of Kalle's shares, the numbers for Kalle were not stated separately.

Source: Numbers from BAL 15/4 Finanzwesen, Normen für die Verteilung der Generalspesen. Ratios by own calculation.

venture in the Norwegian company Norsk Hydro to pursue the production of synthetic ammonia. Following the wish for a deeper vertical integration, the Dreibund in 1908 purchased the coalpit Auguste Victoria close to the German town of Recklinghausen. The required capital for both investments amounted to about 32 million Marks. In consequence, the Dreibund companies undertook the biggest raise in equity in their individual histories: while Bayer and BASF both increased their equity by 14 million Marks from 21 to 32 million Marks, AGFA, the much smaller company, increased its equity by 4.6 million Marks according to the Dreibund quota.⁹

This heavy investment led to an obvious break in Bayer's policy of internal financing, as the funds that could be generated from secret reserves and provisions simply did not suffice the capital requirements. Also, the cooperation with BASF and AGFA meant a constraint in the scope of action when it came to creating secret reserves, as the three companies agreed on using the same rates of depreciation and exceptions had to be approved by all firms. In consequence, Bayer had to sacrifice the company's historical focus on internal financing using secret reserves. At the same time the other two Dreibund companies benefited from a transfer of accounting knowledge and

⁹ BAL 12/3, Protokolle von Direktionssitzungen, vol. 1: Abschrift des Geschäftsführerbeschlusses vom 10. September 1910.

coherent accounting practices, resulting in the convergence of secret reserve values observable above. The very comparable ratio of secret reserves between the former Dreibund and Dreiverband members further indicates that the importance of secret reserves as a tool of corporate finance was not only perceived by Bayer and later the other Dreibund companies, but rather by the entire industry. However, the ratios of secret reserves at Griesheim Elektron and Weiler-ter Meer, the two IG companies that had not been part of any of the two company alliances, were lower and only amounted to approximately 59 per cent of the companies' total reserves. The correlation of a standardised accounting and the importance of reserve policies observed at the Dreibund (and possibly the Dreiverband with Hoechst as the company dictating the accounting terms) even remained valid for the IG. In conclusion, the development of reserve accounts at the IG members does, indeed, suggest a coherent approach regarding asset valuation, not least because the accounting regulation and scholarship had just slowly evolved since 1904 and did not receive major impulses until the 1920s (Camfferman and Detzen 2018, p. 460).

V

The article has provided detailed information on internal financing and the usage of secret reserves in the German chemical industry during the late nineteenth and early twentieth century. It was shown how Bayer became an industry-wide pioneer in developing and applying various means of internal financing using excessive depreciation and the relocation of profits into reserve accounts. This relocation had a direct impact on the company's financial statements, as depreciation was used to smooth profits and dividends. By withholding large parts of the company's earnings, its management was able to artificially fix the company's dividend rate to 18 per cent between 1891 and 1900. Bayer made use of the strategy of creating secret reserves by applying high rates of depreciation until the early twentieth century when most of the company's assets were written down to 1 mark. Due to this technical constraint, Bayer could no longer relocate profits and was forced to increase its official profits accompanied by an increase of dividend payments.

At the beginning of the twentieth century, Bayer's provisions and secret reserves reached the amount of the company's official total assets, meaning that the company assets were in fact twice as big as claimed in the official financial statements. When Bayer in 1903 negotiated the formation of a syndicate with the historically much bigger German chemical company BASF, the mutual disclosure of secret reserves put Bayer in a strong position and enabled the company to receive the same profit quotas as its competitor. Bayer's catching-up process was mostly made possible by the company's strategic focus on internal financing that kept most of the profits within the company.

The article further argued that while the importance of secret reserves and internal finance varied between the companies of the German chemical industry, two processes of market concentration led to a convergence of reserve policies and accounting

regimes. In 1904, the first wave of market concentration resulted in the establishment of two alliances, the Dreibund and Dreiverband. In both alliances, the accounting practices were standardised, leading to all companies having a very comparable ratio of secret reserves in 1915. Even though the convergence of reserve practices was empirically shown only for the Dreibund, it can be assumed that similar processes of convergence also happened in the Dreiverband. In reaction to World War I, the German chemical industry underwent the second wave of concentration with the establishment of the Interessengemeinschaft (IG) that incorporated the former Dreibund and Dreiverband companies, as well as two smaller firms. From its foundation onwards, all IG companies showed very similar developments in their reserve policy. The article thus concludes that the companies' management shaped an image of the firm that only displayed a fraction of their actual financial capabilities.

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