



“Blue Angels,” “Venture Capital,” and “Whales”: Networks Financing the Takeoff of the Second Industrial Revolution in France, 1890s-1920s

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The emergence of startup companies during the takeoff of the second industrial revolution could have spurred a new framework for the financial market to provide them with cash. Conversely, family capital inherited from existing firms and assets accumulated at merchant banks by interests consolidated during the nineteenth century contributed largely to the “economic revolution.” Several industrial corporations that took part in the economic revolution alongside schemes of diversification and/or reconversion towards preceding economies brought in a huge part of this equity. However, new forms of financing added their forces thanks to the investment and deposit banks that mobilized their networks of investors and savers to enlarge the financial markets.

This essay about “blue angels” deals mainly with the financing and the takeoff of the first stage of the second industrial revolution in France during the years from 1890 to 1920.¹ I wish to determine if the mode of financing changed significantly from that of the first stage of the first industrial revolution between 1790 and 1830. Although a number of books have appeared regarding the history of banks, the industrial and tertiary corporations, and their branches, it is unclear if the takeoff of the second industrial revolution benefited from original financing methods that could support a robust and vibrant corporate sector.² Whatever they might have been, their efficiency is undeniable, as the growth of the new system has

¹ “Blue angels,” “venture capital,” and “whales” are used to describe investors in the startups of the third industrial revolution.

² Michael Moss and Philippe Jobert, eds., *Naissance et mort des entreprises en Europe, XIX^e-XX^e siècles* (Dijon, 1995).

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proven to be irreversible. Moreover, it would be unfair and unrealistic to saddle them with the responsibility for the delays and the typological differences that hindered the development of the second industrial revolution in France and other major players such as the United States and Germany.³ In fact, we have known from the past decade or two that French companies on the whole were not actually delayed, but had progressed along lines specifically adapted to the frames of brainpower and innovation, technological culture, the availability of raw materials, the characteristics of the market, and the sociological and cultural makeup of the country.⁴ Having empirically examined “company histories” and scrutinized regional and sectorial records in order to gather data, we have rearranged it within the framework of financing method. This study is thus simply an “essay,” bereft of any claim of a systematic statistical approach, more a descriptive “picture” than a Cartesian “matrix.”

Nevertheless, this picture should give some idea of the dynamism, the variety, and the operating methods for financing of budding industries and services (especially steel metallurgy, the production and distribution of electricity, electro-technology, metallurgic or chemical electro-industries, automobiles, chemistry, aviation, and telecommunication) and the conquest of new markets (modern distribution, overseas technological trade, spin-off companies abroad or overseas). The financial risks need to be gauged alongside forms of long-term loans (overdraft credit lines renewed several times). However, the financial circuits cannot be confined to banks only, we need to look at the role played by “venture capital,” the finance obtained from investors.⁵ We need to determine who these investors were: investment banks (the commercial and the merchant banks), industrial investors in the form of technological or commercial ventures, investing families, regional investors (for example, in the form of “industrial districts”), or foreign investors.⁶ This summary should help us evaluate the financing circuits of the first stage of the second industrial

³ Patrick Verley, “Y a-t-il des modèles explicatifs pour rendre compte des industrialisations des pays d’Europe occidentale entre 1880 et 1970?,” in *L’industrialisation de l’Europe occidentale (1880-1970)*, ed. Jacques Marseille (Paris, 1998), 74-97.

⁴ François Caron, “Innovation et industrialisation,” in *L’industrialisation de l’Europe occidentale (1880-1970)*, ed. Jacques Marseille (Paris, 1998), 100-127.; Robert Belot, Michel Cotte, and Pierre Lamard, eds., *La technologie au risque de l’histoire* (Paris, 2000).

⁵ Jean Lachmann, “Évolution du capital-risque en France,” *Banque & Industrie, Entreprises & Histoire*, n°2 (Dec. 1992): 35-47. This article focuses on the 1950s-1980s.

⁶ Hubert Bonin, “Banque et création d’entreprise dans la France des XIX^e et XX^e siècles,” in *Créateurs et création d’entreprises de la Révolution industrielle à nos jours*, ed. Jacques Marseille (Paris, 2000), 115-137.

revolution, before the second stage grew and flowered from the 1940s to the 1970s.⁷

We intend to identify various types of venture-capitalists (particularly the initial boosters and investors during the developmental phase). The direct investment in funds is not enough to understand the situation in its entirety; we also have to take into account the credit aspect that boosted the growth and maturation of that era’s young startups. The majority of banks had taken on the role of “companions” and participated in the development of these growing enterprises by extending credit lines and based on the principle of “mutual trust,” which led to the emergence of an “economy of trust” so essential to the growth of any sector.

The “Archaic” Forms of Modernity

Paradoxically, almost all authors addressing the “revolutionary” ventures (because they were innovative), refer to the involvement of banks, which should have been long outdated by the change in the economic structures. Many companies were formed without any major external support, with funds from personal fortunes or a network of private funds in a manner analogous to the movement launched by small investors that gave rise to the first industrial revolution. On the other hand, local banks and the big merchant banks of Paris played a decisive role in the takeoff of the second industrial revolution.

Family or Personal Capitalism. Personal or family resources were reallocated and the flexibility of the capitalism these individual or family entrepreneurs represented gave a major boost to innovation. The simple logic of anticipating gains from innovation gave rise to the textile and mechanical families of Alsace such as in Société alsacienne de construction mécanique;⁸ or, a much more revealing example, Peugeot’s shift from textiles, to small-scale machining, to foundry and cycle manufacturing, and, finally, to automobiles.⁹ Often the transmission of money, technological culture, spirit of enterprise, and management skills that formed the transition between the first and the second industrial revolutions took place within the context of family enterprise.¹⁰ As was the case from 1800 to 1840, entry into new technologies was still easily accessible because vertical integration of production was not implemented until the end of the decade. Meanwhile, the existing fragmentary nature of

⁷ François Caron, *Les deux révolutions industrielles du XX^e siècle* (Paris, 1997).

⁸ François Bernard, *L’Alsacienne de construction mécanique, des origines à 1965* (Strasbourg, 2000).

⁹ Alain Jemain, *Les Peugeot. Vertiges et secrets d’une dynastie* (Paris, 1987); Jean-Louis Loubet, *Automobiles Peugeot. Une réussite industrielle, 1945-1974* (Paris, 1990); Jean-Louis Loubet, *Citroën, Peugeot, Renault et les autres. Histoire de stratégies d’entreprises* (Boulogne-Billancourt, 1999).

¹⁰ Andrea Colli, *The History of Family Business, 1850-2000* (New York, 2003).

the production system that continued for the next few years allowed the creation of an automobile company taking full advantage of optimal outsourcing, a decentralization of the manufacturing process, distribution among many subcontractors (before the advent of the integrated company), and a relatively low capital investment. The service bureaus or subcontractors sometimes went in for integration as in the aviation and automobile industries.

Companies which withstood the hazards of the economic situation and the play of market forces obtained a power for auto-financing that allowed them to cross over into the second stage of development before the advent of bankers and later, financial investors. In the case of Berliet and Lumière, in Lyon,

...the small sums gathered locally allowed the establishment of the first workshop and funded the initial production. The limited volume of the production, coupled with a quasi-monopoly in the region translated into substantial profits and gave rise to a significant and rapid power of auto-financing.¹¹

In aviation, the massive profits made during the war due to government orders and the subsequent boom in production meant that “till 1919-1920, the companies were capable of financing themselves.”¹² “These companies [Blériot, Farman, Gnome & Rhône] had become profit-making factories” which reinvested their profits.¹³ Blériot could finance itself completely without recourse to a bank. Finally, historians have shown how, during the transition from this first stage to the stage of integration and a more intense capitalism, many proprietors successfully adapted either by studying in engineering schools (mainly the *Écoles centrales*) or with the help of engineers.

The Lyon region was witness to a transition from the old production system to one of innovation.¹⁴ Berliet, the son of a satin manufacturer, came from the silk trade, as did some of the lesser-known manufacturers (Lavirotte, Audibert, Cottin & Desgouttes).¹⁵ Grammont manufactured

¹¹ Pierre Cayez, “Quelques aspects du patronat lyonnais pendant la deuxième étape de l’industrialisation,” in *Le patronat de la seconde industrialisation*, ed. Maurice Lévy-Leboyer (Paris, 1979), 192-200.

¹² Emmanuel Chadeau, *L’industrie aéronautique en France, 1900-1950. De Blériot à Dassault* (Paris, 1987), 97. Emmanuel Chadeau, “Stratégies d’entreprises et innovations internationales: les motoristes français d’aviation (1918-1940),” *Histoire, économie & société* (second term 1987): 263-287.

¹³ Chadeau, *L’industrie aéronautique en France*, 58.

¹⁴ Michel Laferrère, *Lyon, ville industrielle, essai d’une géographie urbaine des techniques et des entreprises* (Paris, 1960).

¹⁵ Pierre Cayez, “Quelques aspects du patronat lyonnais pendant la deuxième étape de l’industrialisation” in *Le patronat de la seconde industrialisation*, ed. Maurice Lévy-Leboyer (Paris, 1979), 192-200.

copper wires and precious metals for the garment industry (for example, haberdashery) before diverging into the manufacture of copper wires and cables for the electrical industry. Meanwhile, Panhard went from wood machining tools to the automobile industry (wherein wood had long been a necessary material). In the Paris region, too, the automobile industry pioneers drew on family wealth: Citroën came from the world of diamonds, and Renault, who started from a small enterprise dealing with cloth and buttons, sold in 1904, raised the capital of from 60,000 to 772,000 francs (with the help of his brothers). Many of these pioneers accumulated technological and financial capital before venturing into automobiles. For example, Darracq, Richard, Clément, and Peugeot graduated from the manufacture of bicycles; Peugeot, Citroën (already at the head of two small-scale industries [SME] dealing with gears and small electrical equipment), Mors and Delaunay (manufacturer of ship boilers) from engineering. Michelin is a typical case: when their capital went up from 900,000 to 1.6 million francs in 1897, “Most of the new money came from within the extended family—heirs of the Daubrée, Adèle (mother of André and Édouard Michelin) and her sister Émilie... Then...the overwhelming majority of the Michelin stock stayed with the family.”¹⁶

The aeronautic industry

...found its strongest support in the pockets of the technicians who founded it... Before and after the first World War, the aviation houses were established or re-established according to the circumstances, by an intimate alliance between the engineers/inventors or the engineers/manufacturers, who were sometimes penniless, and capitalists who, whether attached to a bank or not, had at their disposal large sums to invest (Deutsch de la Meurthe for Nieuport-Astra, Lazare Weiller for *Compagnie générale de navigation aérienne*, he and his son Paul-Louis Weiller for Gnome & Rhône, and so on).¹⁷

A cotton industry magnate in Havre, Latham went into aeronautic construction in 1922, which was then a major consumer of cloth (canvas). The personal fortune accumulated by Deutsch de la Meurthe from his petroleum business financed the establishment of Nieuport. The aeronautic industry is rife with examples of such extractions from the ancient system: Henri Deutsch de la Meurthe, a distributor of petroleum products, had a change of heart, gave up his old business and entered into the modern petroleum industry. He sold his business to Shell and turned into a financier of aircraft manufacturers, Astra to the tune of one million francs (1908) and then Nieuport (1911).

¹⁶ Herbert Lottman, *The Michelin Men: Driving an Empire* (London, 2003), 38.

¹⁷ Emmanuel Chadeau, “Le Crédit lyonnais et les fils d’Icare dans l’entre-deux-guerres,” in *Le Crédit lyonnais, 1863-1986*, ed. Bernard Desjardins et al., (Genève, 2003), 421-428.

Louis Blériot was the owner of an SME dealing in automobile accessories (headlamps); Louis Esnault-Pelterie owned a cotton SME at Amiens that his father lent him 2.6 million francs to start. Both Morane and Saulnier were sons of industrialists; the Bréguet had been mechanical engineers since the eighteenth century (clock and watch-making, maritime navigation equipment); Louis Seguin was the director of an automobile engineering SME before he established Gnome & Rhône with a fellow director (1910); Marcel Bloch drew both on his family’s fortune and the family SME’s know-how in furniture making to start the manufacture of propellers as well as aircraft which were then often made of wood. His partner Potez dipped in his own pocket to finance his first workshop (1921-1928).

In the field of electro-technology investors also rose from the ranks of family inheritors: “The Neufville and the Ellissen borrowed from the initial capital of the French Edison companies in 1882.”¹⁸ The concept of “businessman” (“*homme d'affaires*”) was concretized when the investor-entrepreneurs came together to explore the feasibility of an innovative subsidiary. Some young industrialists created *Compagnie pour la fabrication des compteurs* in 1872, and the Thomson-Houston in 1893. Regarding the electrical industry of the Alpine Piémont:

...often the founders of these enterprises had pre-existing personal resources. Even among inventors, to come up with a new invention is not in the domain of a simple artisan—technical knowledge and material are required... Thus, the social background of these founders was more restricted than that of the mechanical engineering entrepreneurs of Lyons who were often ex-craftsmen turned industrialists. Instead, here we find aristocrats: Paul Lacroix was the son of a notable citizen of Toulouse; Paul Héroult the son of a tannery industrialist coming from Normandy; etc.¹⁹

They later paid themselves back in the form of shares issued for property when their companies went public and the number of shareholders increased.

Being the sons of the director of a plumbing and heating company in Grenoble meant that Hippolyte and Aimé Bouchayer were endowed with a solid social and financial base supplemented by their wives’ substantial dowries. Their personal fortune allowed them to invest outside

¹⁸ Pierre Lanthier, *Les constructions électriques en France: financement et stratégie de six groupes industriels internationaux, 1880-1940* (Thesis, Paris 10-Nanterre University, 1988).

¹⁹ Hervé Joly, “Les origines des entreprises électrométallurgiques et électrochimiques des Alpes du Nord (fin XIX^e-début XX^e siècles): l’exception au modèle dominant,” in *Des barrages, des usines et des hommes: L’industrialisation des Alpes du Nord entre ressources locales et apports extérieur*, ed. Hervé Joly et al. (Grenoble, 2002), 117-133.

the family circle and adopt the role of entrepreneurs. They guided the company (with the help of their engineer brother August) into the manufacture of specialized pipelines for hydroelectricity. They were truly “*bourgeois entrepreneurs*,” as their financial assets equaled their share in the family business.²⁰ This explains Hippolyte Bouchayer’s 1897 investment in the company at Chedde (chlorates) with a loan from Charpenay to supplement his personal fortune. He then incorporated this Savoyard factory into the electro-chemical and electro-metallurgical company Alais, Froges & Camargue, and served on the boards of several national and regional enterprises.

In many instances, as was the case in the rest of the industry, the heads of family-owned industries invested funds in new ventures to diversify the risk-capital. “In general, the manufacture of electrical products in its initial stages fitted neatly into the policies of diversification and integration adopted by established family enterprises” as was the case with *Compagnie électromécanique*, which grew in the 1880s to include three companies that manufactured boilers, steam engines, and cables.²¹ When the hydroelectric revolution began in the Alpine Piémont, “the pioneers’ capital came from their families or from relations which they had maintained in the region from which they came” (Aristide Bergès, Henri Gall, Paul Héroult, etc.).²² When Merlin-Gerin, an electrical equipment manufacturing company was established at Grenoble in 1919, Hippolyte Bouchayer pumped in 25,000 of the 150,000 francs required: “An engineer friend, Henri Joucla, brought in for each of them (Merlin and Gerin) an additional 25,000 francs.”²³ In similar fashion, a small group of thirteen engineers (including the three founders) financed 88 percent of the startup cost of *L’Air liquide* with 50,000 francs (1902); investors (joined by other wealthy patrons over the coming years) funded the other 12 percent.²⁴

The regional centers of this innovative vitality are easy to identify. In Alsace, the Koechlins, who were already quite active in the textile machine industry, moving into the manufacture of locomotives and steam engines. They consolidated this shift by sponsoring the creation of *Société alsacienne de construction mécanique* (at Belfort), which turned out to be

²⁰ Robert Smith, *The Bouchayers of Grenoble and French Industrial Enterprise, 1850-1970* (Baltimore, Md., 2001).

²¹ Pierre Lanthier, “Dynasties patronales et construction électrique en France: une greffe qui n’a pas pris,” *Entreprises & Histoire* (n°9, Sept. 1995): 17.

²² Henri Morsel, “Le patronat alpin français et la seconde révolution industrielle, 1869-1939,” in *Le patronat de la seconde industrialisation*, ed. Maurice Lévy-Leboyer (Paris, 1979), 201-208.

²³ Felix Torres, *Une histoire pour l’avenir. Merlin Gerin, 1920-1992* (Paris, 1992), 22.

²⁴ Muriel Petit-Konczyk, “The Financing Process of a Startup: L’Air liquide, 1898-1913,” working paper, École supérieure des affaires-Lille 2 University, 2004.

pivotal in the electro-mechanical revolution. A little later, the family of industrialists behind the Schlumberger textile machines spun off the Conrad and Marcel branch, which went into oil exploration technology (*Société de prospection électrique*, forerunner of Schlumberger) in the 1920s. The father supplied the half million francs required for the startup in 1919.

In Lyon, at the cutting edge of chemistry, the family put up the entire capital of 3 million francs required for the establishment of Lumière (photographic plates and paper) in 1892. Similarly, the friends and family circle of the Poulenc helped the three brothers launch their company in 1900 with a capital of 4 million francs. The fortune made by the Gillets in their dye-manufacturing business allowed them to explore and enter into the new field of artificial silk (Izieux, 1904), then into the entire range of artificial textiles (*Comptoir des textiles artificiels*-CTA, associated to *Usines du Rhône* in Rhodiaca in 1924) (viscose, rayon, and so forth) and also in the new organic chemistry sector (Progil). However, there is a key difference from the first industrial revolution, when wholesale-traders (*négociants*) played a decisive role by climbing the production ladder; wholesale trading was no longer an important factor in the industrialization of France. Aside from the Renaults, only Gilliard who, associating himself with the chemist Monnet, explored the new chemistry in the 1870s and 1880s and went on to establish the chemical company *Usines du Rhône* in 1895 with a capital of 3 million francs.²⁵

The Last Hurrah of the Local Banks? Although the small size of the “local banks” limited their funding ability with respect to the new startup companies, they made an appearance in some cases. In the North, though the local banking community was relatively absent from the new and emerging steel and iron metallurgy, the old family bank of Dupont played a part in *Société des tubes de Valenciennes*. It is true that due to the setbacks the *Crédit lyonnais* went through during the 1860s, “the bank at Lyon did not, in any decisive fashion, help or support the new enterprises.” “The industry thus depended on auto-financing or on external sources of capital... There was an almost complete rupture between the financial and industrial circles except in the domain of the production and distribution of electricity.”²⁶ In fact, the modest Évesque bank (later Jacquier-Falcouz) along with Demachy-Seillière, a merchant-banking house of Paris, gave “the essential support required for the growth of the project” to *Société*

²⁵ Pierre Cayez, *Rhône-Poulenc, 1895-1975* (Paris, 1988), 14-22.

²⁶ Pierre Cayez, “Quelques aspects du patronat lyonnais pendant la deuxième étape de l’industrialisation,” in *Le patronat de la seconde industrialisation*, ed. Maurice Lévy-Leboyer (Paris, 1979), 192-200.

lyonnaise des forces motrices du Rhône.²⁷ These two banks played a major role in the initial launching of the company shares and securities in 1896 by underwriting it (along with the *Crédit lyonnais*) and by advancing it the required funds when it faced difficulties during its first decade. Another local bank of Lyon, the Cottet, partnered a Swiss company to create *Société des câbles électriques Berthoud Borel* in 1897, which became *Compagnie générale des câbles de Lyon* in 1917 (now Nexans), and helped it to raise its first capital from Rhone investors before it was bought out by *Compagnie générale d'électricité* in 1917. In chemistry, *Banque privée*, a newly-formed local bank that brought together some Lyons' capitalists, helped establish the Poulenc brothers between 1900 and 1920 and occupied two seats on their executive board. We also find it involved with the Lumière company.

Can we conclude that this “consensual capitalism” arose within the ambit of an “industrial district capitalism” in which the banks were the recipients of networks of innovation and investment? In fact, this stimulation of a consensual enterprising spirit arose on a local scale, an agglomeration of an industrial region. The “local banks” which were active at a single center or which offered one or more services (on the scale of the French administration, which had a radius of 100 to 200 km from the departmental center) attained the pinnacle of their influence during the years from 1910 to 1920. For the most part, they contented themselves with being commercial banks. Several dozen of them, though, also took on the role of “industrial banks” through a sustained policy of long-term loans (including overdraft facilities), by investing in companies' shares and sometimes by setting up a small regional stock market.

It was the complete empathy between the cultural and technological aspects that allowed a number of small local capitalists to prevail upon the banks and get the credit required to start up, then maintain their enterprise, and, finally, to solicit other investors to come forward and pump in additional funds. In the regions in question, some tens or hundreds of wealthy families vacillated among investing locally in land and property, getting into the Paris stock market, or supporting the local economic development. Like their predecessors during the first half of the nineteenth century, they were “capitalists” who mobilized their personal inheritance to feed the closed circuit (short channel) of the money market by refinancing the local banks' long-term credit (through promissory notes and long-term fixed deposits) or by buying the bonds these companies issued from the local banks.

This local capitalism, whether or not it took the form of an industrial district, was also instrumental in the creation of enterprises at the turn of the twentieth century. It followed faithfully—though on a larger

²⁷ Denis Varaschin, “Un vrai compte de fée: le *Crédit lyonnais* et la *Société lyonnaise des forces motrices du Rhône*,” in *Le Crédit lyonnais, 1863-1986*, ed. Bernard Desjardins et al. (Genève, 2003), 461-481.

scale—the route laid out by the beginning of the first industrial revolution. That revolution indirectly financed its successor as the wealth accumulated by “capitalist” families in the nineteenth century was subsequently available in the form of investments. It was a capitalism of sponsorship, where inter-family trust was of paramount importance. This form of local capitalism remained active until around the 1950s because the spate of innovations took place mainly with the support of mid-size enterprises that could be financed by locally available funds. While awaiting the results of the systematic study our colleagues in Paris and Franche-Comté are conducting, the case of the center at Isère provides an example of the capitalistic, industrial, and banking intimacy enjoyed by the Alpine “entrepreneurs” during the years from 1890 to 1930.

When, at the beginning of the century, the distribution of (electric) current grew rapidly, a speculative fever for hydroelectric power gripped the local bankers and industrialists. The entrepreneurs dealing with heavy construction, the cement manufacturers and the boilermakers who had in the meantime turned into pipeline manufacturers [...] bent all their resources into drawing up plans for the establishment [of hydroelectric plants].²⁸

They initiated dozens of companies, some of which were later bought out by Parisian groups. In Chedde, for example (electrochemistry in Haute-Savoie, 1895),

the capital of 2.8 million francs, put up by the local banker Charpenay, was brought in by industrialists of Grenoble who were interested in the equipment and material used in the installations (cement for Thorand & Nicolet, pipelines for Joya, machines for Bouchayer & Viallet and turbines for Breniet & Neyret).²⁹

In fact, this banker from Grenoble, Charpenay, became a partner in a number of companies via his overdraft facility and by taking on the role of share certificate broker. He helped mobilize his clients’ family inheritances, turning them into investors in new enterprises. When Neyrpic was formed in 1917, “we would like to draw the attention of industrialists and capitalists of Grenoble.... We are not so much interested in a mass subscription as subscriptions from people whose influence could

²⁸ Henri Morsel, “Le patronat alpin français et la seconde révolution industrielle, 1869-1939,” in *Le patronat de la seconde industrialisation*, ed. Maurice Lévy-Leboyer (Paris, 1979), 201-208.

²⁹ Hervé Joly, “Les origines des entreprises électrométallurgiques et électrochimiques des Alpes du Nord (fin XIX^e-début XX^e siècles): l’exception au modèle dominant,” in *Des barrages, des usines et des homes: L’industrialisation des Alpes du Nord entre ressources locales et apports extérieurs*, ed. Hervé Joly et al. (Grenoble, 2002), 117-133. Combine Ludovic Cailluet, *Chedde: Un siècle d’industrie au pays du Mont-Blanc* (Grenoble, 1997).

help us.”³⁰ That was an unambiguous expression of the founders’ desire to associate themselves with the usual business relations: potential customers, various suppliers, stationers, metallurgists, important people from local industrial circles, and personal relations. They were all included under the policy of “bringing together the business and private circles.” This kind of empathy found in Grenoble can be seen in a number of cases in the decades of the growth of the Alpine industry. “A culture of overdraft flourished in Isère” and these overdrafts accounted for two-thirds of the banking business in the 1920s.³¹ The local bankers sat on the executive boards of many of their client companies and channeled the savings into financing the share certificates that they issued.

The Renaissance of the Merchant Bank Houses. Towards the end of the 1830s, we do find some examples of a big merchant bank (or “*maison de Haute Banque*”) taking interest in the industrial development. The Seillières financed the third startup of the Creusot establishment under the management of the Schneider brothers while the Rothschilds entered into the railway business. These associations were refreshed at the turn of the twentieth century: the house of Seillière, which became Demachy-Seillière, partnered the alliance between the Wendels and the Schneiders around Joeuf (1880). The Schneiders and the Wendels each retained two parts of the capital while the bank retained a fifth part and the presidency (held by Charles Demachy until 1901). The patronage of this *maison de Haute Banque* did much for their image and brought with it the useful stamp of a “big industrial project,” however little innovation it represented in this Far East of iron and steel metallurgy. Sometime later, the Rothschilds participated in the creation of *Forges & aciéries du Nord & de l’Est*, though it was more to support the development of its subsidiary *Chemins de fer du Nord*.

Catherine Omnès has shown just how involved French merchant banks were in the emergence of the steel tube industry: “In the almost complete absence of any initiative on the part of the regional banks—in contrast to what was happening in some regions of France—it was the *Haute Banque* which not only brought in the funds but also, at the time of debentures floating, provided the advantages of a financial network which

³⁰ André Neyret, quoted by Anne Dalmasso, “Une entreprise ‘dauphinoise’ dans l’entre-deux-guerres: Neyrpic (NBPP). Ambiguïtés et limites de la notion d’entreprise régionale,” in *Des barrages*, ed. Hervé Joly et al. (Grenoble, 2002), 301-318.

³¹ Hubert Bonin, “Les banquiers grenoblois des années 1890-1940: un modèle spécifique?,” in *Des barrages*, ed. Hervé Joly et al. (Grenoble, 2002), 185-209. Hubert Bonin, “Les banques rhône-alpines aux XIX^e et XX^e siècles,” in *Région Rhône-Alpes, 500 années-lumière. Mémoire industrielle*, ed. Yves Lequin (Paris, 1991), 332-389.

spanned across countries.”³² The house of Mirabaud which, with the help of the engineer Marchel Champin, had carefully studied the new branch’s growth potential, decided in 1909 to finance *Forges de Recquignies* (established in 1907). This interest in metallurgy on the part of Mirabaud also explains its support of a Renault company that found itself in financial difficulties from 1922 to 1926. It not only brought the company financial succor, but, more importantly, gave it a psychological advantage in the locality due to the confidence that such an association inspired. The fairy tale story of *L’Air liquide* brings to mind the key role played by the house of Vernes, which helped finance the modest company in 1902. To the 50,000 francs in capital, it added its loan of 20,000 (guaranteed by a company executive who staked his personal fortune) that made a decisive difference to the young company,³³ which did not yet have any assets: “Its support was more important as a ‘reputation-capital’ than as any actual funds [to counteract] the absence of any guarantee and reputation.”³⁴ In 1912-1913, with a little intervention by Davillier, it took 0.8 percent of the capital.

As these small merchant banks were not as fearful as the large Parisian establishments about maintaining their level of deposits, they could be more nimble and afford to take risks in new and innovative sectors. At the same time, they were also providentially placed at the information crossroads with respect to investment opportunities and (thanks to their relationships) investors on the lookout for risky yet promising ventures. Historically, many of them retained “industrial bank” traditions (railways, mines, iron and steel works, and so forth) that they carried over in exploring the new avenues opened by the second industrial revolution. The best example, in addition to Mirabaud, was Lazard, which became Citroën’s house bank from 1926 to 1929.

The Financial Bankers as the High Flyers of the Industrial Revolution. Meanwhile, besides such well-known merchant banks in the Paris market, several mid-size merchant banks helped pave the way for the industrial revolution. Unlike their competitors, they did not have the advantage of a wide network of relations. They were amenable to taking greater risks because they broke the invisible tethers of the “positional advantage” enjoyed by “classic” banks. These bankers often had the mentality of “businessmen,” in being quite open to financial “opportunities” to advance themselves and enrich their portfolio of clients and contracts. Such financier-bankers were active during the first industrial revolution (Mirès,

³² Catherine Omnès, *De l’atelier au groupe industriel: Vallourec, 1882-1978* (Paris, 1980).

³³ Gérard Emptos, “La création de l’Air Liquide au début du xx^e siècle,” in *Créateurs et création d’entreprises de la Révolution industrielle à nos jours*, ed. Jacques Marseille (Paris, 2000), 677-692.

³⁴ Muriel Petit-Konczyk, “The Financing Process of a Startup.”

Ouvrard, and also the Pereires). At the turn of the twentieth century, the Elissen³⁵ (descendants of the Pereires who still controlled a part of their old shares, especially Banque transatlantique) involved themselves in the new technologies (*Société industrielle des téléphones*, *Edison française*, and *Tréfileries & laminoirs du Havre*; the energy holding *Compagnie générale du gaz pour la France & l'étranger*). They had financial assets inherited from the first wave of industrialization and needed investment opportunities besides Parisian real estate and property development.

We have some revealing examples of the availability of free capital in the hands of these financier-bankers who coasted so adroitly into the new capitalism. When the steel tube industry was established, the Montbard firm turned to *Banque française d'Afrique du Sud* (BFAS) and to Gunzburg, another banking house inclined towards “industrial opportunities in France and Russia.” BFAS had its fingers in many stock market and financial transaction pies such as gold mines, and seemed headed towards metallurgy. It was replaced by another banking house, *Crédit mobilier français*, which was on the lookout for new portfolios and, under the control of businesspersons ready to shake the hold retained by Paribas and the young *Banque de l'union parisienne* (BUP), took over from the Pereire brothers. In 1895, BFAS took on the role of chief catalyst in the transformation of *Société normande d'électricité* (established in 1887-1888) under the aegis of Pierre Azaria:

Nemours Herbault, the director of the BFAS and a former agent of Parisian stockbrokers, became one of the directors of *Compagnie générale d'électricité*. His brother, Charles Herbault, director of BFAS and of all the companies which would form CGE, also administered *Société normande d'électricité*. [This BFAS] allowed the founder of CGE [...] to build for himself a rich network of industrial relationships, before establishing *Compagnie générale d'électricité* in 1898. Just as Camille Chabert, another director of BFAS and CGE, operated (for another 10 years) an *Omnium Lyonnais* which oversaw the network of contacts between various energy companies and Parisian banks. Another emerging house, *Banque internationale de Paris*, was “the source of the assets of the companies and groups competing with Thomson, such as *Compagnie générale de traction* and *Compagnie générale d'électricité*.³⁶

In 1901, *Banque française pour le commerce & l'industrie* (BFCI) brought together BFAS and *Banque internationale de Paris* and manifested

³⁵ About Elissen, see Emmanuel Chadeau, *L'économie du risque. Les entrepreneurs, 1850-1980* (Paris, 1988), 249-263.

³⁶ Pierre Lanthier, “L'industrie de la construction électrique en France avant 1914,” in *Histoire de l'électricité en France*, vol. 1, 1881-1918, ed. François Caron and Fabienne Cardot (Paris, 1991), 687.

the same spirit of enterprise that distinguished its predecessors. After its merger with *Banque nationale de crédit* (BNC) in 1922, the new bank still retained this spirit, as it had to carve a place for itself in the Paris market by taking risks and venturing into emerging sectors. Thus in the 1920s, it partnered the aeronautic branch of *Messageries maritimes* and of Latham. It went on to play a bigger role by becoming the principal bank behind an integrated group comprised of some ten companies, *Société générale aéronautique*.

For the most part, conventional banks ignored the potential gains and profitability of the new companies (which often turned in erratic accounts) and, in general, shrank from taking the relatively higher risks involved. On the other hand, two pioneering branches of industry did not lack support from financier-bankers. The vicissitudes of the automobile industry explain how Lucien Rosengart, a financier, came to be a manager at Peugeot when it fell short of funds in 1920-1923. Then, thanks to his loans, he figured prominently at Citroën between 1923 and 1926. He turned into a “man of influence” who could have wagered on capitalistic groups that encouraged speculative ventures. Similarly, the “speculator” Oustric extended large credit lines to Peugeot in the second half of the 1920s; he specialized in putting his money into sick branches and betting on their revival (*Papeteries de Gascogne* in Landes, a group of companies in the footwear industry, and so forth).³⁷ His participation in the revival of Peugeot brought him into the big industry league. In 1926-1927, his bank extended some 100 million francs in long-term loans to Peugeot, enabling it to issue share and bond certificates, retain its independence (which had come under threat from the financier Rosengart), and, most importantly, pursue its modernization program and take to the taylorization and fordization of its Sochaux factory. It ended with the fall of Oustric in 1930. The financier-bankers of the house of Bauer & Marchal, close associates of Oustric, involved themselves in the aviation industry by partnering with Gnome & Rhône, the manufacturer of aircraft engines. Other young banks, such as *Banque des pays du Nord* (Morane-Saulnier), *Banque privée* (Saulnier), Adam (Caudron), Gunzburg (Astra), also helped the nascent aeronautic industry. In all these new branches, these financier-bankers, who navigated the new capitalism with such consummate ease, each seemed to seize the opportunity, in his own way, to get a privileged position in supporting some company or other, without assuming the mantle of a general policy. Their small size and the image of “a new kid on the block” gave them the ability to “listen”³⁸ and to innovate, qualities that served them well.

³⁷ Hubert Bonin, “Oustric, un financier prédateur? (1914-1930),” *Revue historique* (Oct. 1996), 429-448.

³⁸ Thierry Gaudin, *L'écoute des silences: Les institutions contre l'innovation?* (Paris, 1978).

Venture Capital and the Development Capital in Search of Modernity

If the “ancient” sectors proved their financial flexibility via their openness to new technologies and branches, an analysis of the transitional period between the two industrial revolutions should unearth the practices, forms, and networks representative of a more clear-cut “modernism,” especially with respect to the “big” banking and financial businesses and the allocation of resources in enterprises or the savings market.

The Role of the Investment Banks à la française. The investment banks *à la française*, which acted as commercial corporate banks, dealing with the issue and brokerage of share certificates and managing share portfolios, but no retail banking, managed venture and development capital in their own way. In fact, they were the initiators in the creation of companies, as their role of “godmother” allowed them to be managing underwriters for the issue of shares (bonds and certificates), while retaining their privileged position as wholesale banks. Although the majority of deposit banks limited their role as commercial banks, these business banks went on to become key partners in the development of some of the emerging sectors. That is how Paribas came to figure prominently in the establishment of several railroad companies in Spain, Latin America, and Russia, and in the development of the iron and steel companies in Belgium and France.³⁹ However, more frequently, Paribas preferred to act as a fellow traveler with industrialists who initiated the seeding of new technology rather than to manage and oversee stock transactions. It remained a finance-bank without any specific “industrial strategy,” with a few exceptions. Paribas’ share-portfolio remained modest and was confined, for the most part, to public service companies (electricity and railways) (see Table 1).

TABLE 1
Distribution of Paribas’ share portfolio

	Finance banks and companies	Public utilities	Industry	Value (in millions of current francs)
1880	21.2	65.4	8.7	41
1890	24.0	49.9	18.8	38
1900	25.4	49.9	35.5	52
1913	38.4	43.8	35.5	156
1919	40.5	37.8	10.9	232
1928	45.6	14.1	33.3	393

³⁹ René Girault, *Emprunts russes et investissements français en Russie* (Paris, 1973).

The investment bank gave precedence in its investments to establishing its “finance group,” and the creation of subsidiaries, especially outside France and overseas (Morocco, for example). Paribas maintained its status as a bank and did not set itself up as a financial and industrial conglomerate.⁴⁰ It very rarely established any “industrial partnerships,” such as a policy of development capital and the strategic control of industrial or tertiary companies (other than its sister companies and subsidiaries). “The course of action followed by our establishment over the past few years was hardly conducive to dealing in industrial affairs.”⁴¹ It was only a chance rescue operation that placed it more or less in control of Norsk Hydro in 1911.⁴² Up until then, it had only supported the company (with 6.5 percent of the stock after the 1906 increase in capital) when it was introduced on the Paris stock market. It then became the lead underwriter during the transfer of BASF’s operations to the market investors in 1911 when this Norwegian chemical company had to be completely reorganized. Similarly, the financial crisis of some of its industry partners forced it to initiate rescue operations by extending long-term credit and the instigation of financial consolidation measures:

Thus, between 1920 and 1928, Paribas had the greatest difficulty in meeting, through its own funds, the financial requirements of all the companies it was involved in. Moreover, it was obliged to support some of them by the means of costly advances that it hesitated or found difficult to meet. Apart from the specific problems posed by some unfortunate decisions during the immediate post-War period, it would seem that the French investment banks did not have the means to grow in keeping with their industrial ambitions.⁴³

Though there were exceptions, the sums involved were not large as was the case with CSF (*Compagnie générale de télégraphie sans fil*) in the field of telecommunications. Established in 1918 with the help of Paribas and a cable company (*Compagnie générale des câbles télégraphiques*), CSF soon took control of an electrical-radio parts manufacturing unit: “The solidity of its founders, especially Paribas, guaranteed that it would be able to follow the delayed development of this activity.”⁴⁴

⁴⁰ Éric Bussière, “Entre la banque mixte et la banque d’affaires: la Banque de Paris et des Pays-Bas et sa stratégie industrielle, 1900-1930,” *Entreprises & Histoire* n°2 (Dec. 1992): 49-64.

⁴¹ Éric Bussière, *Paribas, l’Europe et le monde, 1872-1992* (Anvers, 1992).

⁴² Bertrand de Lafargue, *Investissements extérieurs et concurrence franco-allemande. La Norvégienne de l’Azote, 1886-1920* (Thesis, Lille University 3, 1986).

⁴³ Éric Bussière, “Entre la banque mixte et la banque d’affaires,” 64.

⁴⁴ Pascal Griset, “La société Radio France dans l’entre-deux-guerres,” *Histoire, économie & société* (First term 1983), 83-110.

As was the case for other commercial banks, Paribas did not hesitate to partner companies with proven maturity and solidity, especially those it could support on the financial market. When the chemical company Poulenc parted ways with *Banque privée*, Paribas stepped in and, with a clear understanding of the development of modern chemistry and the need for long-term capital, organized the issue of share certificates in 1924. This role of a companion in development, once the venture-capital stage was reached, became one of the key functions of the business banks which, it must be said, were very efficient at issuing share certificates and managing the confidence capital which is so important for all listed companies.

The strongest impact of Paribas and, on a smaller scale, its rival BUP, was felt in the electrical sector. The investment banks hoped to mobilize their knowledge base and their network of investors to establish themselves as the leaders in the issue of share certificates and take advantage of the “massive financial requirements of electrification.”⁴⁵ They could also, here and there, partner emerging companies. In any case, they believed that the market was destined to grow rapidly, with a greater surety and speed than in the sectors meant for the higher classes (the automobile industry) or those dependent on the whims of government orders (aeronautics). “Despite the occasional setbacks, the banks were greatly attracted to this sector due to the rapid growth in demand, its relative predictability and the resulting safety of the investments.”⁴⁶

The Gradual Involvement of the Commercial Banks

The very nature of deposit banks restrained them from venturing into new industries and left the door open for investment banks and financiers-bankers. Their strategy was to prudently watch the growth of these young startups and await the stabilization of their financial situation, hence: “the hesitancy of a financial world which, in its majority, was intrigued by such a new field.”⁴⁷ That is why they often involved themselves only at the third stage of these companies’ growth: consolidation. The third Paris commercial bank *Comptoir national d’escompte de Paris* (CNEP) waited for a decade after the establishment of *L’Air liquide*, until its capital was consolidated before becoming its reference bank, in addition to merchant

⁴⁵ Éric Bussière, “Paribas et le financement des affaires d’électricité dans les années 1920: entre stratégie bancaire et stratégie de groupe industriel,” in *Les compagnies électriques et leurs patrons: Stratégies, gestion, management, 1895-1945*, ed. Dominique Barjot et al. (Paris, 2001), 153-161.

⁴⁶ Ibid.

⁴⁷ Jean-Louis Loubet, “Les pionniers de l’automobile,” in *Créateurs et création d’entreprises de la Révolution industrielle à nos jours*, ed. Jacques Marseille (Paris, 2000), 152.

bank Vernes.⁴⁸ Similarly, *Crédit lyonnais* and its colleagues joined Citroën’s bank pool only after its reorganization in 1926-1927.

In the aeronautic industry, the clients loyal to *Crédit lyonnais* made up only a minority of the enterprises.... The reason behind the restricted nature of its clientele and the fact of its coming so late—essentially not before 1929—was because *Crédit lyonnais* preferred to wait and put off its involvement.⁴⁹ The division of financial labor, which was so emblematic of the French economy from the 1880s, maintained its tradition in the face of this new technology, the coming of the airplane. It fell to the small and mid-sized corporate banks and to the private creditors (the network of individual and family investors) to shore up and help this new technology to see the light of day. Their task was two-fold: first, during the period of invention (1908 to 1913) and next, during the first wave of industrialization over the War years (1914-1918).... The post-War vicissitudes of the industry did not favor the entry of the commercial banks.... During these years (1923-1928) *Crédit lyonnais* looked for ways to enter into the field but was staggered at the sums involved and the instability of those very market segments which could bring in the long-term revenues capable of justifying costs and bank interests.⁵⁰

Still, the hazards of its own history (thanks to the personal relationship that gradually developed) made every big bank partner with another company. *Crédit lyonnais* became the bankers of “the airframe manufacturer Lioré & Olivier, which was carefully scrutinized with care and made the subject of four study reports between 1923 and 1935.”⁵¹ In 1896, *Crédit lyonnais* had gone into partnership with *Forces motrices du Rhône*, its only venture into the world of electricity at that time (excepting its involvement in *Société lyonnaise des eaux & de l’éclairage*) and helped in its issue of share certificates. In the meantime, a long-lasting (“historic”) relationship was forged between *Société générale* and diverse new firms. In fact, it was *Société générale* that oversaw, in 1898, *Compagnie générale d’électricité*’s first bond issue and occupied a seat on its managerial board. The active role played by the director of its Longwy agency ensured that it occupied the primary position in the banking and financing activities of *Aciéries de Longwy*. Similarly, the good work of its branch office at Havre allowed it to play a decisive role in the development of Latham (founded in 1922), an aircraft manufacturer. As for the CNEP, it became the “principal

⁴⁸ Alain Jemain, *Les conquérants de l’invisible: Air liquide, 100 ans d’histoire* (Paris, 2002), 39.

⁴⁹ Chadeau “Le Crédit lyonnais,” 420.

⁵⁰ *Ibid.*, 423.

⁵¹ *Ibid.*, 420.

bank of Thomson and of *Compagnie des compteurs*” and sponsored *Tréfileries & Laminoirs du Havre*.⁵²

The Industrialists: Masters at Diversifying into Innovative Sectors

As always, the existing industrialists were the major catalysts in the creation of the new enterprises. In the course of their expansion, they established sister concerns or subsidiaries that constituted many outlets for their production, within the framework of a technological subsidiary integrated back to front, or as a means towards the diversification of their portfolio. There many examples; every branch experienced this process of strategic expansion. On the other hand, there were companies such as Pechiney that missed the boat. Pechiney boss Alfred Rangod failed to get into electrochemistry and electrometallurgy because he thought that the existing techniques seemed more reliable than the innovations. Nevertheless, many others saw the potential benefits offered by innovation. The industrialists who matured during the years 1850 to 1880 took up the processes the traders set underway in the years 1780 to 1830, when they changed their reactive policies into pro-active ones. The fact that they discovered new innovations could be what distinguished them from those who succumbed to the crises of obsolescence (the reason for the collapse of *Terrenoire*, the first iron and steel industry) and the need for technological conversion in the years 1860-1890.

The healthy growth of the chemical sector in Lyon, through the interlacing of common subsidiaries, can be explained by the investments in diversification made by the major textile (Gillet) and chemical (Rhône-Poulenc) companies. At the same time, the Gillet group kept its branch of artificial textiles (CTA) as an autonomous entity from 1920 to 1960. It, too, expanded into a number of subsidiaries specializing in some material or innovative technology. The case of *Saint-Gobain* is a good example of an industrial group that, having sufficient funds for regular auto-financing, could afford to diversify into side businesses, making good use of their expertise in the management of complex technological processes. In 1924, *Saint-Gobain* formed *La Cellulose du Pin* (a paper mill in Landes). More importantly, it then went on to found, in 1928, *Compagnie des produits chimiques & des raffineries de Berre* (near Marseille) by injecting 70 percent of the 250 million francs in capital before *Crédit lyonnais* and *Crédit suisse* came forward with 65 million and 70 million francs, respectively.⁵³ The company could afford to flex its financial clout:

⁵² Pierre Lanthier, “L’industrie de la construction électrique en France avant 1914,” François Caron and Fabienne Cardot, eds., *Histoire de l’électricité en France*, vol. 1: 1881-1918 (Paris, 1991), 687.

⁵³ Jean-Pierre Daviet, *Un destin international: La Compagnie de Saint-Gobain de 1830 à 1939* (Paris, 1988).

“Considering the high profit margins during the 1920s, there was no dearth of capital.”⁵⁴

In the iron and steel industry, the so-called “classic” companies (because of their foundries and iron-works) began to reorient themselves to the new steel sector. Before their rupture in 1926, Schneider and the Wendels worked together for decades at De Wendel & Co. (established in 1880) and their Joeuf factory at Lorraine, which incorporated the new steel technologies. Also in 1880, five mid-sized industrialists of Lorraine joined forces to set up a factory downstream, *Aciéries de Longwy* (with a capital of 15 million francs, mostly in the form of pre-existing assets) without the help of any bankers.⁵⁵ In 1920, the three companies Marine, Micheville, and Pont-à-Mousson came together on a German site to establish *Aciéries de Rombas*. This trend towards downstream activities and diversification was repeated when the iron and steel industrialists sought to support the growth on steel tubes: thus, Châtillon-Commentry, Marine, and Saint-Chamond helped establish *Tubes de Montbard*. Inversely, companies went upstream by supporting *Forges de Recquignies* (steel tubes), which brought together material and transport companies (Dyle & Bacalan; *Ateliers de construction électriques du Nord & de l’Est*) railways and automobiles; although non-iron metallurgists were also present.

Schneider’s rich history includes the stories of its many subsidiaries: in electro-technology (*Jeumont-Schneider* in 1902; *Le matériel électrique Schneider-Westinghouse* in 1929), at the same time it also ventured into hydroelectricity in the Alps (*Force & Lumière*, at the beginning) to create outlets for its products while getting the electric power needed for its factories at Burgundy.⁵⁶ Engineering manufacturers diversified into electro-technology (generally without any lasting success): Delaunay-Belleville (boilers) and *Société industrielle des téléphones* SIT (cables) with the CEM (*Compagnie électro-mécanique*) in 1885, which resulted in a long lasting technological agreement with the Suisse Broy Company (BBC) in 1899, or Fives-Lille. Even aviation benefited from the mobilization and diversification by some industries of a part of their technological capital. Renault diversified from automobiles into aircraft engines while Penhoët (naval engineering) entered Bréguet aircraft in 1933-1934 by injecting 5 million francs into the company.

⁵⁴ J.-P. Daviet, *Saint-Gobain, une multinationale à la française, 1665-1984* (Paris, 2002), 89.

⁵⁵ Labbé (at Mont-Saint-Martin); Oscar Renaud, baron d’Adelsward (at Mont-Saint-Martin); Raty (at Saulnes); D’Huart (at Senelle); De Saintignon (at Longwy).

⁵⁶ Dominique Schneider et al., eds., *Les Schneider: Le Creusot: Une famille, une entreprise, une ville (1836-1960)* (Paris, 1995). Tristan de la Broise and Felix Torres, *Schneider, l’histoire en force* (Paris, 1996).

The service sector also underwent a transformation. The commercial revolution from 1890 to 1930 saw the established companies take to the spirit of innovation in a big way. In the face of chain stores and cooperatives, the big Paris department stores branched out into “popular shops” (*Uniprix* from *Nouvelles Galeries* in 1928; *Prisunic*, from *Printemps* in 1931; *Monoprix* from *Galerias Lafayette* in 1932). In similar fashion, the branch offices of the textile group of Charles Pollet & Sons in the north (*Pollet-Motte*, *Pollet-Six*, *Pollet-Derville*) went into retail sales in 1922 before launching mail-order selling with a catalog in 1928 under the name of *Filatures de La Redoute à Roubaix*.⁵⁷ *Messageries maritimes* went for a vertical integration into the new aerial transport business with the *Air Orient* (1927) and a manufacturing company, *Chantiers aéronautiques de la Seine* (1920), followed by *Société provençale de constructions aéronautiques* (1925).

Consensual Capitalism: The Venture Capital Networks. For the most part, this capitalism à la française was instrumental in bringing together symbiotic interests and thus help in the creation of enterprises that resulted in the second industrial revolution. Companies formed themselves into nucleation centers that brought together investors and sponsors. This “consensual capitalism” was made up of amorphous groups moved either by a “central nucleus,” generally an industrial company, or an autonomous one destined to grow. When the iron and steel industry came into being, metallurgists, collieries, railroad companies (which used rails) and banks came together to support the “large enterprises” such as *Forges & aciéries du Nord & de l’Est* (Paribas; Rothschild and *Chemins de fer du Nord*; *Chemins de fer économiques*; *Mines de Lens*, and so forth).

The field of electro-technology is a classic example. The parts manufacturers founded companies for the production and distribution of electricity, as did the public works companies, in order to land civil engineering contracts. Suppliers helped in the companies’ growth and it was only gradually that parallel autonomous and specialized groups were established. *Énergie électrique du littoral méditerranéen* was created in 1900 under the aegis of Thomson-Houston (electrical equipment) and *Grands Travaux de Marseille*, which implemented the first projects. Consumers and clients also took part, as they were very much interested in the modernization of the industry and improvement in quality and rates. Thus, *Société lyonnaise des eaux & de l’éclairage*, Paris-Lyon-Marseille (PLM) railways, and the electro-metallurgist Alais, Forges & Camargue were also involved in the creation of the *Énergie électrique du littoral méditerranéen*.

⁵⁷ Francis Petit, Jacqueline Grislain, and Martine Le Blan, eds., *Aux fils du temps: La Redoute* (Paris, 1985).

Imported Innovation: Money in the Transfer of Technology

As in a number of other countries, foreign direct investment also played a part in the creation of new enterprises. The potential of the French market attracted many companies heading towards multi-nationalization.

The Banks as Trojan Horses of Foreign Companies. Shell was thus set up in France with the backing of BUP, which also promoted the Belgian group Petrofina in the mid 1920s, by becoming the major shareholder in its French subsidiary, Petrofina France, and in *Raffineries de pétrole du Nord* while representing French interests in the Belgium parent company. Meanwhile, Paribas partnered Standard Oil (of New Jersey) and was represented by *Compagnie Standard franco-américaine* (1920) and *Standard franco-américaine de raffinage* (1929). Funding, extending credit, and stock market sponsoring were all used to lubricate this imported petroleum revolution.

The field of electro-technology offers a number of well-known examples of importing technology and capital with the help of banks, contributing to the “Frenchization” of the resulting subsidiaries. At Lyon from 1897 to 1917, Cottet backed the Swiss company Cortailod in establishing its subsidiary and a factory for manufacturing electrical cables. Paribas helped the English Electric Company set up *Constructions électriques de France* (factories at Vénissieux et Tarbes) from 1919 to 1922. The two also got together in 1923 to start *Énergie électrique du Rouergue*, to tap the hydroelectric reserves in the Massif Central. The finance-banking house of “Bénard & Jariloswki became the chief bank of the Empain group in France prior to 1914.”⁵⁸

The Groups of Foreign Industrial and Financial Investors. The growth of the steel tube industry owed much to a converging of French and foreign interests, especially in the north: “The investment banks [Mirabaud, *Banque française de l’Afrique du Sud*, *Crédit mobilier français*] were able to see more clearly than the French iron and steel industry the future of the first transformation of steel, promote it to the Belgians and give it, right from the beginning, an international setting.”⁵⁹ Several Belgian industrial dynasties took to it, especially Escaut & Meuse (1882) and Louvroil (1890). Electricity historians have unraveled the financial networks that allowed foreign companies (Swiss, German, Belgian, and sometimes English or American) to establish bridgeheads in France and by forming mini-groups, to win for themselves, their products, and patents, a

⁵⁸ Pierre Lanthier, “L’industrie de la construction électrique en France avant 1914,” in *Histoire de l’électricité en France*, vol. 1: 1881-1918, ed. François Caron and Fabienne Cardot (Paris, 1991), 687.

⁵⁹ Omnès, *De l’atelier au groupe industriel*, 48.

substantial market share.⁶⁰ Many Alpine electro-industrial companies were created in partnership with German, Swiss (*Société franco-suisse pour l'industrie électrique*, and so on), and even Austrian firms that bought their patents and then followed with equipment.⁶¹ In 1917, two industrial goods manufacturing companies from Iseres (Neyret Beylier) and Geneva (Piccard & Pictet) launched the Neyret-Beylier-Piccard-Pictet-Neyrpic at Grenoble to manufacture equipment for hydroelectric plants.⁶² After its subsidiary folded in 1907, Westinghouse formed partnerships, most notably with the Schneider group in 1929 (which lasted until 1964) to establish a common subsidiary, *Le matériel électrique SW*, which also included the Grammont factory at Lyon.⁶³

On a different scale, *Compagnie française Thomson-Houston*, which had access to General Electric's patents, turned into a nucleating center for companies generating electricity and manufacturing electrical goods: “Most of these enterprises had a limited capital of which the CFTH held only a minor part. The bulk of the financing was done with the help of loans which weighed so heavily on profits, that in a number of cases, the

⁶⁰ Peter Hertner, “Les sociétés financières suisses et le développement de l'industrie électrique jusqu'à la Première Guerre mondiale,” in *Un siècle d'électricité dans le monde, 1880-1980 : actes du premier Colloque international d'histoire de l'électricité*, ed. Fabienne Cardot (Paris, 1987), 341-355; Luciano Segreto, “Du ‘Made in Germany’ au ‘Made in Switzerland’: Les sociétés financières suisses pour l'industrie électrique dans l'entre-deux-guerres,” in *Un siècle d'électricité dans le monde, 1880-1980*, ed. Fabienne Cardot (Paris, 1992), 347-397. Serge Paquier, “Banques, sociétés financières, industrie électrique,” Youssef Cassis and J. Tanner, eds., *Banques et crédit en Suisse, 1850-1930* (Zurich, 1993), 241-266; Luciano Segreto, “Le rôle des investissements suisses dans l'industrie électrique française jusqu'à la Deuxième Guerre mondiale,” in Association pour l'histoire de l'électricité en France, *Le financement de l'industrie électrique, 1880-1980* (Paris, 1994), 199-216; Luciano Segreto, “Le rôle du capital étranger dans l'industrie électrique,” in *Histoire de l'électricité en France*, vol. 2: 1919-1946, ed. Maurice Lévy-Leboyer and Henri Morsel (Paris, 1994), 982-1019.

⁶¹ Hervé Joly, “Les origines des entreprises électrométallurgiques et électrochimiques des Alpes du Nord (fin XIX^e-début XX^e siècles): l'exception au modèle dominant,” in *Des barrages, des usines et des hommes. L'industrialisation des Alpes du Nord entre ressources locales et apports extérieurs*, ed. Hervé Joly et al. (Grenoble, 2002), 117-133.

⁶² Anne Dalmasso, “Une entreprise ‘dauphinoise’ dans l'entre-deux-guerres: Neyrpic (NBPP). Ambiguïtés et limites de la notion d'entreprise régionale,” in *Des barrages, des usines et des homes: L'industrialisation des Alpes du Nord entre ressources locales et apports extérieur*, ed. Hervé Joly (Grenoble, 2002), 301-318.

⁶³ Guy Tournoux, “Jeumont-Schneider,” in *Des entreprises pour produire de l'électricité*, ed. Fabienne Cardot (Paris, 1988), 247-267.

profits came exclusively from the sale of equipment.”⁶⁴ This explains the heavy load weighing on this emerging French market and the reticence of the companies in this sector that were modeled on French companies (Bréguet, Mors, Fives-Lille, Schneider, and so forth). To free itself from this stranglehold, *Compagnie générale d'électricité* (1898) turned to the Swiss to complete the network that had been set up a decade earlier by its founder. Azaria received technological help from the Swiss company Brown-Boveri and financial support from *Banque suisse & française* (of the banking house of Bâle, and which became the *Crédit commercial de France* in 1917), which opened up an easier passage to the financial market.

Still, there were some Swiss investors who, with a will to “speculate” on rising stock, injected funds here and there. Thus, in 1899, the Boissonnas group of Geneva sponsored the creation of the hydroelectric company *Force & Lumière* at Grenoble and maintained control over it until 1923.⁶⁵ As issues of “nationalism” somewhat hampered this penetration, industrialists resorted to increasing their financial holdings in a bid to “Frenchify” their interests and unearth local allies.⁶⁶ The 1920s saw the establishment of well-known holdings such as the Sofina, Elektrobank, and *Société centrale pour l'industrie électrique*, all of which were, to a greater or lesser extent, linked to Swiss, German, or Belgian conglomerates.

Consensual Capitalism and the Economic War. In response to this foreign invasion in capital and technology, the government itself began to encourage, both during and after the War, a form of consensual capitalism: either by facilitating the financing of innovative programs (especially in aeronautics), or by bringing together industrialists and bankers to supply the country with the equipment needed for economic independence. In 1916, Paribas, Kuhlmann, *Norvégienne de l'Azote* and Lambert-Rivière launched *Compagnie nationale des matières colorantes & des produits chimiques* with capital of 40 million francs. *Aciéries de France*, *Moteurs Chaléassière*, public works companies, and Paribas also established naval shipyards during the war, such as *Chantiers navals français* at Caen in 1917.

The best example is *Compagnie française des pétroles*. The government pushed private investors to reject the only Anglo-Saxon offer (or the Belgian: the understanding of 1929 resulted in the creation of the

⁶⁴ Jacques Marseille and Félix Torres, eds., *Alcatel-Alsthom. Histoire de la Compagnie générale d'électricité* (Paris, 1992), 30.

⁶⁵ Henri Morsel, “Le patronat alpin français et la seconde révolution industrielle, 1869-1939,” ed. Maurice Lévy-Leboyer (Paris, 1979), 201-208.

⁶⁶ Pierre Lanthier, “Holdings et sociétés d'investissement,” in *Histoire de l'électricité en France*, vol. 2: 1919-1946, ed. Maurice Lévy-Leboyer and Henri Morsel (Paris, 1994), 948-981.

CFP and later, with the entry of Iraqi oil, *Compagnie française de raffinage*). Along with the government (contributing 35 percent), the distributors of petroleum products, chemists, and banks (with relative equilibrium between the two investment banks Paribas and BUP who took the lead in the issue of share certificates) came together.⁶⁷ The commercial banks' participation was more symbolic, though they did go on to mobilize their networks to absorb the huge number of shares issued in the 1930s and thus contribute to giving the country a truly nationalized petroleum industry. A similar process went into the establishment of *Compagnie nationale du Rhône* in 1929-1932.⁶⁸ It assembled industries that either needed electricity or supplied electrical equipment (25 percent), railroad companies (25 percent), and local groups (City of Paris, City of Lyon, Departments, and so forth) in an enterprise that would, over several decades, build a chain of barrages on the Rhone. In contrast, after seeing management by a private company for some years, the government chose to take on the telecommunication field revolution by creating a public sector monopoly in telephones. Only radio broadcasting continued in the hands of the private sector.⁶⁹

Helping the Innovators to Continue

After startup and takeoff, came the stage of organic maturation and financial consolidation. Companies needed to face and overcome competition, economic shocks, and cash flow problems. Innovation then had to address the age-old issue: the structure of the balance sheet.

The Capacity for Auto-Financing: The Basis for Growth. Often the young startups did not need the support of external resources for growth. In fact, as is the case whenever a new sector is taking-off, companies can dip into the abundant profits brought in by the advancing technology. For the first few years, the majority of the steel tube manufacturers “went for the production of high value-added goods which were not subject to cut-throat competition.”⁷⁰ This increased profits and prevented a drop in the unit profit margin. In the automobile sector, the French manufacturers enjoyed a healthy profit margin (for example, Peugeot between 18 and 20

⁶⁷ Hubert Bonin, *La Banque de l'union parisienne. Histoire de la deuxième banque d'affaires française (1874/1904-1974)* (Paris, 2001), 174-186.

⁶⁸ Alexandre Giandou, *La Compagnie nationale du Rhône (1933-1998): Histoire d'un partenaire régional de l'État* (Grenoble, 1999).

⁶⁹ P. Griset, “L'État et les télécommunications internationales au début du xx^e siècle: un monopole stérile,” *Histoire, économie & société* (1987/2), 181-208. Pierre Aulas, *Les origines du téléphone en France (1876-1914)* (Paris, 1999).

⁷⁰ Omnès, *De l'atelier au groupe industriel*, 61.

percent).⁷¹ Michelin’s profits allowed it to expand its activities from making cycle tires to the manufacture of automobile tires in 1896.⁷² In 1914, net profits amounted to 20 million francs on capital of some 100 million francs.

Thanks to these advantages, a number of young companies had a very robust capacity for auto-financing, very strong percentage-wise, but small in volume due to the relatively small size of their capital. These funds allowed the companies to grow for years with some autonomy and freedom. The “wise” ones among them assured their survival (and insured themselves against the vagaries of the economy) by constantly putting something in reserve. The young *Compagnie générale d’électricité* managed to add to the 52.2 million francs collected from the market “large reserves which equaled the capital stock in 1914 and which reduced somewhat the dividends granted to the shareholders.”⁷³ Michelin managed to give out large dividends while also adding substantially to its reserves (25 million in reserves against a capital of 30 million in 1914).

Helping the Young Enterprises Safely Negotiate Their Teething Problems. Still, an increasingly competitive environment and the vagaries of the economy meant that the young upstarts faced financial difficulties. The recessions of 1901 and, especially, of 1907-1908, followed by the post-war depression of 1920-1921, the re-adaptation of the whole production system from a war economy to a peace economy, and the fiscal setbacks that were echoed in the confidence and credit domains, all played a role in destabilizing these enterprises. Could it be that new mechanisms were put in place to help consolidate the gains of the industrial revolution and capitalist organizations? Many recent companies have experienced financial difficulties when their capacity for auto-financing fell short of the required investments.

Some specific instances are available among banks: Paribas “was faced with the question of survival of many of the companies it had an interest in.”⁷⁴ It had to come to the rescue of *Forges & aciéries du Nord & de l’Est* during the period from 1921 to 1923, although it was *Mines de Lens* that assumed the role of strategic shareholder of the enterprise by subscribing to an increase in capital and took charge of repaying the bankers’ loans. In a similar manner, the Delaunay-Belleville (automobiles and boilers) was salvaged with the help of Marine-Homécourt, a

⁷¹ Jean-Louis Loubet, “Les pionniers de l’automobile,” Jacques Marseille, ed., *Créateurs et création d’entreprises de la Révolution industrielle à nos jours* (Paris, 2000), 155.

⁷² Alain Jemain, *Michelin: Un siècle de secrets* (Paris, 1982). André Gueslin, ed., *Michelin, les hommes du pneu* (Paris, 1993), 23. Lottman, *The Michelin Men* (2003).

⁷³ Marseille and Torres, *Alcatel-Alsthom*, 86.

⁷⁴ Bussière, “Entre la banque mixte et la banque d’affaires,” 58.

metallurgist who brought in fresh funds, while *Énergie électrique du Rouergue* was reconstituted in 1927-1928 with the help of the Belgian *Vieille-Montagne* followed by UFIE, an electrical group and *Chantiers navals français*, which was painfully reorganized and taken up by two naval shipyard companies with the backing of *Crédit lyonnais* and Paribas. On the other hand, when Paribas could not rescue a company, it had to bear, along with its partners, the entire loss, as happened in the case of its electronic protégé, *Constructions électriques de France*, which it reanimated between 1921 and 1927 before its transfer to the industrial group Alstom in 1928.

The big question concerned the mid-sized companies that were still, in the first quarter of the twentieth century, the base of the emerging second industrial revolution. A number of “classic” deposit banks sponsored a majority of these companies and thus directly contributed in limiting the effects of an economic “Darwinism.” Contrary to preconceived notions, almost all the studies on deposit banks show the important part played by “long term credit” (overdraft [secured advances/loans on collaterals]) even if discount credit accounted for the bulk, with or without passing via the *Crédit national*.⁷⁵

Just as in the case of the mid-sized and regional banks, a “banking nursery” system flourished within the large banking houses. We must also note the part played by the directors of the larger branches who had such a stabilizing and positive effect in the regions. There are any number of documents that show how, due to their store of information, both “personal” (gathered from the social circles) and “real” (derived from evaluating the borrowing and auto-financing capacities of their clients), these directors successfully supported local companies. Thus, for example, a branch of *Société générale* at Clermont-Ferrand sponsored the establishment of a group of distributing subsidiaries and the one at Longwy helped mid-size metallurgical companies. “The banker knew how to select: there are many inventors and innovators, but one must have a knack to fish out the most dependable ones” and to help them by means which went well beyond those possible by the “classic” banks.⁷⁶

Banks sought to help the mid-sized enterprises grow into large companies and reach the next rung on the ladder to capitalism. When, at the beginning of the century, *Société chimique des Usines du Rhône* was in a crisis, *Société générale* extended a long-term credit of 2 million francs in 1899/1900 and 1903 and had its financier-banker appointed to its board.⁷⁷ In 1905, he supervised reorganization of the capital and acted as its director and manager: “These strong measures probably revived some

⁷⁵ Michel Lescure, *PME et croissance économique. L'expérience française des années 1920* (Paris, 1996).

⁷⁶ J.-P. Daviet, in “Les grandes banques françaises ont-elles aidé les entreprises?,” *Entreprises & Histoire* (n° 2, Dec. 1992): 88.

⁷⁷ Pierre Cayez, *Rhône-Poulenc, 1895-1975* (Paris, 1988), 39-41.

confidence in the French customers and suppliers.... *Société chimique des Usines du Rhône*, which was bailed out by the bankers, started off on a new course of development.” Later, *Crédit lyonnais* and CNEP took upon themselves the restructuring of *Énergie électrique du littoral méditerranéen* which, in 1926, was on the verge of a collapse with debts of 221 million francs over a capital of 175 million. The banks that assumed a discrete and permanent control injected the required investment of 220 million francs; acting in the name of their saving and investing clients and on their own credit they endorsed the share certificates.⁷⁸ Ingenuity prevailed, through overdraft facilities, new issues of bonds and shares, transforming departments into subsidiaries in order to issue new share certificates, and so forth. Their main purpose was to help these companies successfully negotiate the 1920s, which were years of maturation and consolidation. However, very often the priority was placed on increasing capital so that it would lead to the issue of bonds.

The automobile industry saw a number of cases in need of such reorganization. In the mid-1920s, when Citroën’s financial position turned precarious, Lazard took over as its banker. Its representatives reorganized the auto manufacturer’s financial management, developed the specialized credit company that financed the distributor’s stocks and credit sales, brought in liquid assets, and assured the issue of share certificates, thus saving the ailing Citroën.⁷⁹ In 1921, *Crédit lyonnais* came to the rescue of Berliet, a Lyon automobile manufacturer, by granting it a financial aid package and also extending a credit line (while at the same time assuming the presidency of its managerial board from 1921 to 1929). In 1921, Mirabaud helped Renault financially and in 1922, cosponsored the creation of a business corporation (joint stock company), *Société automobile des usines Renault* (retaining 4 percent of the capital against the 81 percent held by Louis Renault). It continued to patiently support Renault’s financial recovery during the mid-1920s and financed several of its subsidiaries in exchange for a promise from Louis Renault for a more prudent form of management.

This improvement in the company’s financial position allowed *Crédit lyonnais* to insert itself and slowly increase its influence by extending overdraft facilities (cash credit), discounts and guarantee bonds. As in the case of Citroën, the deposit bank could extend its credit line in keeping with the financial strength of its client. Renault could thus make

⁷⁸ André Straus, “Le Crédit lyonnais, les sociétés électriques et le marché financier français dans l’entre-deux-guerres,” in *Le Crédit lyonnais, 1863-1986*, ed. Bernard Desjardins et al., (Genève, 2003), 429-459. In 1933, *Énergie électrique du littoral méditerranéen* was rich with a capital of FRF 400 million and with a bond debt of 733 million.

⁷⁹ Hubert Bonin, “Les banques face au cas Citroën (1919-1930). Essai d’appréciation de la puissance bancaire,” *Revue d’histoire moderne & contemporaine* (Jan.-Mar. 1985).

up for its separation and final rupture from Mirabaud in 1929-1930. “After 1930, *Crédit Lyonnais* became Renault’s main bank, sitting on the board of one of its subsidiaries and even advancing loans to the company.”⁸⁰ The history of aeronautics is that of a constant capitalistic reorganization. Sometimes though, banks did put in an appearance to back promising enterprises, such as in the case of Bréguet, which was helped financially with some tens of millions of francs between 1927 and 1933.

Sometimes, the company restructurings resulted in the entry or help of foreign investors or foreign influences as was the case when the alpine electro-industrial company *Électro-Chimie-Bozel* (established in 1888) reorganized itself in 1906. *Banque suisse & française* underwrote two-thirds of the stock issued to recoup the losses and resume operations.⁸¹ It represented Swiss investors who replaced the original German industrial partners by injecting some Swiss savings into a promising company endowed with solid assets that only needed an improvement in its management. On the other hand, a certain stage in the development of some companies led to the localization of capital that was too dispersed and Paris-based. Thus in 1893-1894, *Société électrométallurgique française-Froges* (1888) (aluminum) brought in investors based at Lyon and Isère, such as the local bankers Cottet and Morin-Pons of Lyon, and Charpenay and Rey of Grenoble. Similarly for *Électro-Chimie*, which saw the local bank of Annecy, Laydernier sponsor the issue and investment of share certificates and underwrite on its own a block of shares in 1919.

To Create Groups? Flexibility of Structures and the Second Industrial Revolution. Generally, the trend of the industrial revolution led to a “consolidation” of growth in capitalism, in the name of economies of scale and to the advantage of companies which created a greater capacity for auto-financing and unlocking larger funds for themselves. Although France did not escape this tendency towards concentration, it was not as marked as in Germany, the United States, the United Kingdom, and the Netherlands; in France, the growth was predominantly organic. Only a few centers were formed to “create” new robust enterprises. The first was in the banking world: inspired by the mergers achieved by IG Farben and the ICI, Société générale (which had already tried to bring together *Usines du Rhône* and another company from 1903 to 1905), CCF, and Paribas (which had taken the place of Banque privée as the banking house of Poulenc

⁸⁰ Patrick Fridenson, *Histoire des usines Renault: Naissance de la grande entreprise, 1898-1939* (Paris, 1972), 129-130.

⁸¹ Hervé Joly, “Les origines des entreprises électrométallurgiques et électrochimiques des Alpes du Nord (fin XIX^e-début XX^e siècles): l’exception au modèle dominant,” in *Des barrages, des usines et des homes: L’industrialisation des Alpes du Nord entre ressources locales et apports extérieur*, ed. Hervé Joly (Grenoble, 2002), 117-133.

since the mid-1920s) supported the merger of *Usines du Rhône* and Poulenc to form Rhône-Poulenc in June 1928. Each of the banks had a representative sitting on its board (out of thirteen directors), but the new company could be capitalized at no more than 36 million francs.⁸² Paribas took an advisory and financial role in the integration of the *Compagnie nationale des matières colorantes* in Kuhlmann (chemistry) then in the constitution of Alsthom, which in 1928, brought together two electro-technological companies (Thomson-Houston and *Société alsacienne de construction mécanique*) and in addition, took over *Constructions électriques de France*.⁸³ Still, the banks' influence seemed limited: for example, Paribas could not bring about a streamlining of the iron and steel works in the 1920s, nor really influence the restructuring of the electro-technological industries in stark contrast with what it did in the 1960s and 1970s.

The creation of Vallourec in 1927 brought together several steel tube companies; the capitalistic grouping of some of these companies was the work of the industrialists themselves, although partner banks did approve of and support the process. Similarly, it was the Lorraine-Dietrich airframe manufacturers who established the large *Société générale aéronautique* in 1929-1930 to put together a vertically-integrated group (with a half-dozen different companies), even though BNC did support it to with some 130 million francs in credit.⁸⁴ This amalgamation was a highly risky venture and a huge wager on the future of this sector. Consequently, it also brought together a number of banks that were not among the most important or the more “classic.” True, the merchant bank of Neuflyze was involved, but it had to partner with “high-flying banker-financiers” (Bousquet-Gunzburg, Thalmann, Lubersac, Buurmans, *Banque transatlantique*), emerging mid-sized and large banks desirous of gaining entry in the locality (CCF, BNC, *Banque des pays du Nord*, CFAT) and a regional bank (*Société nancéienne*) that had been trying for several years to become a national player. Such a merger was very possible within the context of an extremely fragmented industrial branch, but it resulted in a managerial and financial fiasco in 1933.

“Forced” mergers were rare, but bankers could do nothing to stop them. In the shipping world, *Chargeurs réunis* was taken over by a competitor from Marseille in the mid-1920s and the merchant bank of Mirabaud was helpless to either help or stop it. Globally speaking, one cannot exaggerate the role played by the commercial banks in the

⁸² Cayez, *Rhône-Poulenc, 1895-1975*; Fabienne Gambrelle and Félix Torres, *Innovator pour la vie. Rhône-Poulenc. 1895-1995* (Paris, 1995).

⁸³ Louis Carpentier, “L’Alsthom,” in *Des entreprises pour produire de l’électricité*, ed. Fabienne Cardot (Paris, 1988), 269-283. Marseille and Torres, *Alcatel-Alsthom*.

⁸⁴ Hubert Bonin, *La Banque nationale de crédit. Histoire de la quatrième banque de dépôts française en 1913-1932* (Paris, 2002).

restructuring. No single “super-power” was a factor in the consolidation of the industrial revolution. Paribas “stuck to the separation of the tasks of management and stabilization of companies. It confided the charge of conception and implementation to an industrialist while retaining the responsibility of supervising and managing financial aspect”⁸⁵ and, in 1927, *Norvégienne de l’Azote* itself became allied with IG Farben.

The vast majority of mergers and takeovers were the natural result of the growth of big enterprises as was the case in the field of electro-technology.⁸⁶ The industrialists and bankers put together a strategy that led to the grouping of electrical sector forces and, in turn, attracted investors. The consortium of the six Parisian “sectors,” which took the form of *Compagnie parisienne de distribution d’électricité* (CPDE) in 1907, and later, that of several producers as *Union d’électricité* (1910) in the installation of modern plants, can be seen as the result of the need for the issue of several hundreds of millions of francs in bonds as much as it was a search for economies of scale, with the backing of all the big banks from the Paris region. The industrial and financial reorganization of *Union d’électricité* in 1919 gave rise to large stock transactions and Paribas and BUP shared the lead-management of the issues: the capital increased six times, from 5 million francs in 1919 to 350 million in 1930; bonds were also issued.⁸⁷ The company assumed a key role in the building of trust between the market and the world of electrical business ventures.

As was the case abroad and in foreign participation in France, semi-financial and semi-industrial holdings were created to manage the allocation of resources in the new sectors, around the “group of the *rue de Messine*” (whose center was *Société lyonnaise des eaux & de l’éclairage*) and of the Durand group (around *Énergie industrielle*). These vertically-integrated groups brought together the production, transport, distribution, and installation of electrical equipment by means of long-term shareholding. This gave them strategic and financial control with the help of banks that were delighted to see that such an investment-hungry industry could still inspire confidence in the financial market and investors. On the other hand, CGE, which had been involved in equipment and electricity production from its inception, gradually turned to capital equipment and development and bought a number of companies to form, within a quarter-century, an integrated group capable of financing the acquired subsidiaries (*Câbles de Lyon*, etc.).

⁸⁵ Éric Bussière, “Entre la banque mixte et la banque d’affaires: la Banque de Paris et des Pays-Bas et sa stratégie industrielle, 1900-1930,” *Entreprises & Histoire* n°2 (Dec. 1992), 60.

⁸⁶ Pierre Lanthier, “Dynasties patronales et construction électrique en France: une greffe qui n’a pas pris,” *Entreprises & Histoire* n°9 (Sept. 1995): 13-24.

⁸⁷ Fernand Scheurer, “Le financement de la croissance de l’industrie électrique privée: l’Union d’électricité, 1919-1946,” in *Le financement de l’industrie électrique, 1880-1980*, ed. (Paris, 1994), 34-39.

Towards Groups that Managed Part of the Internal Reallocation of Resources. In keeping with the trend towards centralization that marked a new stage in the second industrial revolution, a new development was the constitution of “groups” capable of generating financial resources. From this arose the concept of the “group bank,” though its national influence was still limited. If Schneider resorted to the BUP, its main banking partner, it availed itself of its financial holding, *Union européenne industrielle & financière*, which was a means of accessing the central European subsidiaries. In addition, by raising funds or activating dividend revenues, it assured a relatively free circulation of capital among them. Then, in 1927, Schneider took over a commercial bank specialized in the financing of intra-European trade, *Banque des pays du Nord*, and turned it into its all-purpose bank. The Wendel group also added the merchant bank Demachy (formerly Demachy-Seillière) to its network of banking partners and during the years from 1910 to 1920 turned it into its chief operating bank.⁸⁸

The aim was not so much to reduce the margins of the big banks as to open several finance options, to have some flexibility in the management of the funds, and, certainly, the freedom to circulate cash within the group without external interference. To the extent that its group diversified, CGE equipped itself with both banking and financing tools. Just as *Électro-Crédit* financed the purchase of clients, sub-holding companies were also established (*Financière lorraine d'électricité*, *Union houillère & électrique* in 1926, *Provinciale d'électricité* in 1924, and so forth), which “meant that a number of portfolio transactions could be conducted in keeping with the prevailing policies.... It was a question of having a nimble tool, some light framework which could act quickly while remaining relatively discrete,” especially when it came to buying a share of stock from target or friendly companies. These groups had access to abundant financial resources and managed major investment portfolios in the form of conglomerates.⁸⁹ For example, CGE’s holding in *Tréfileries & laminoirs du Havre* (cables and electro-technological material) ballooned from 18 million francs in 1918 to 178 million in 1930 (compared to the 96 million directly held by industrialists) due to the increase in the number of subsidiary companies and partners.⁹⁰

⁸⁸ Matrimonial alliances favored this control operation: Ernest Seillière (1861-1955) married Germaine Demachy; their son Jean Seillière (born in 1901) married Renée de Wendel, the son of whom is Ernest-Antoine Seillière (born in 1937).

⁸⁹ Marseille and Torres, *Alcatel-Alstom*, 112-113.

⁹⁰ Emmanuel Chadeau, “Les Tréfileries & laminoirs du Havre de 1897 à 1930,” in *Des entreprises pour produire de l'électricité*, ed. Fabienne Cardot (Paris, 1988), 285-303.

Consolidation of the Emerging Industries: The Access to the Financial Market. As soon as the young companies proved stable, showed their market viability, and demonstrated their self-financing capabilities, the system took to its classic mode. Now that they were assured of these companies, the commercial banks began to include them in their fold. Especially in the automobile sector, once the companies stabilized themselves between 1921 and 1927/1929, the banks fought to become the creditors. At Citroën, it was Morgan, BUP, and Lazard that came together to form a banking pool and support the new growth stage—until the crisis of 1934. At Peugeot, Société générale, Crédit lyonnais, and CNEP replaced Oustric in 1930, though BNC (later BNCI) stayed away.

It was natural that companies with a stable structure and bright prospects would issue shares and make their presence felt in the financial market. However, it took several years for some of them to be quoted on the stock exchange, and in such cases, informal share markets sprang up in the locality or in Paris via the “*la Coullisse*,” an over-the-counter market. The extent to which it helped the young companies’ growth can be judged by the fact that the capitalization of the stock (321 million francs) to the *Coullisse* amounted to half the value on the official stock market in Paris (645 million francs). To cite an example, this over-the-counter market, assisted by an important broker named Chauve, helped *L’Air Liquide* increase its capital of 50,000 francs to 7 million francs between 1904 and 1911 by getting together some 1400 small investors willing to take a risk.⁹¹

Once it had stabilized after the shaky period during the 1880s and 1890s, the stock market surged upwards. In 1918, even the ancient company of Saint-Gobain issued shares for the first time since 1702. Between 1920 and 1930, its capital increased five-fold while the number of shareholders went from 2000 in 1918 to 40,000 in 1930 because it needed to finance major diversification projects in the emerging sectors of the second industrial revolution. The flexibility of the stock market played a decisive role in the emergence of these new sectors. Within a period of only some 12 years (1901 to 1914), several steel tube manufacturers turned to the stock market and “the stock and bond issue of the companies such as Louvroil, Montbard, *Forges de Recquignies* and of Escaut & Meuse amounted to more than 30 million francs—a not insignificant sum considering the youth of these enterprises.”⁹²

The arrival of the electrical sector on the financial market has been extensively studied. The coming together of the commercial and mercantile banks proved very effective in the issue of share certificates during the years from 1910 to 1920. In this regard, the involvement of

⁹¹ Pierre-Cyril Hautcoeur, *Le marché boursier et le financement des entreprises françaises, 1890-1939* (thesis, University of Paris 1, 1994). “Asymétries d’information, coûts de mandat et financement des entreprises françaises, 1890-1936,” *Revue économique* (Sept. 1999), 1053-1087.

⁹² Omnès, *De l’atelier au groupe industriel*, 67.

Crédit lyonnais was noteworthy with 75 percent of the placements in 1900-1914; 51 percent in 1915-1920; 39 percent in 1920-1929 and 45 percent in 1930.⁹³ Within the span of two decades, the young startups grew into large enterprises and the sheer amount of money reached dizzying heights. Within the single year of 1926, the electrical sector weighed in at 800 million francs on the market, with 450 million in hydroelectricity— an indication of the intensity of the capitalism attained. The electric stock that accounted for less than 5 percent of the Paris Stock exchange at the beginning of the century attained 17 percent in 1909. In 1930, 15 percent of the profits made by *Crédit lyonnais* came from dealing in the stock of electric companies. The rapid innovation in this sector created its own stock exchange.⁹⁴

Conclusion

This subject remains quite open to discussion and it would be inappropriate, if not downright silly, to try to draw any definitive conclusions. Any such attempt would entail an ambitious study and a comparison of the beginnings of the three industrial revolutions, and the role the banks played in each. The authoritative work done by Maurice Lévy-Leboyer concerning the first half of the nineteenth century⁹⁵ and what we have outlined for the inter-War period⁹⁶ should be brought to bear on venture capital and development capital at the turn of the twenty-first century. A key question involves the banks’ flexibility: the perennial debate between the negative perception regarding their conservatism and awareness of their capacity for reactivity remains unresolved. Our own view is somewhat more positive, as in the case of electricity:

There is no doubt that the shaky beginnings of the electric sector in France kept more than one banking house wary and at a safe distance. At the same time, all its problems and vicissitudes did not keep the electrical industry from getting the required funds. It always found investors interested in a sector that, in spite of its initial hiccups, retained all its

⁹³ Bernard Desjardins, “Contribution à l’étude du rôle du Crédit lyonnais dans le financement de l’industrie électrique (1900-1943), in Monique Trédé-Boumer ed., *Le financement de l’industrie électrique, 1880-1980* (Paris, 1994), 193-198. André Straus, “Le Crédit lyonnais, les sociétés électriques et le marché financier français dans l’entre-deux-guerres,” in *Le Crédit lyonnais, 1863-1986*, ed. Bernard Desjardins et al., (Genève, 2003), 429-459.

⁹⁴ André Straus, “Le financement de l’industrie électrique par le marché financier,” in *Histoire de l’électricité en France*, ed. Maurice Lévy-Leboyer and Henri Morsel (Paris, 1994), 904-947.

⁹⁵ Maurice Lévy-Leboyer, *Les banques européennes et l’industrialisation internationale dans la première moitié du XIX^e siècle* (Paris, 1964).

⁹⁶ Hubert Bonin, *Les banques françaises de l’entre-deux-guerres* (Paris, 2000); vol. 2: *Les banques & les entreprises en France dans l’entre-deux-guerres (1919-1935)*; vol. 3: *Les activités financières des banques françaises (1919-1935)*.

promises. Nobody doubted that the massive development of electricity in the neighboring countries would end, sooner or later, by infiltrating into France.⁹⁷

In fact, the history of banking is rife with stories of innovative industrialists who, despite rejection by the banking establishment, always managed to find a banker willing to support them, be it in a mid-sized bank or the manager in the branch office of a large banking house who was open to the prospective client’s arguments. The key to banking’s doors was inter-bank competition: “Between these two banks [CNEP and *Banque internationale de Paris*] there was, without any room for doubt, a keen competition” in financing the emerging electrical industry.⁹⁸ The deposit banks, each with its own methods and system of analysis, and the investment banks, each with its own network of merchant banks and investors, were often shaken by a director of one merchant bank who had been seduced by some branch or enterprise. Or sometimes, it was a financier-banker who in establishing an “upstart” banking house or aggressive investment bank had loosened the established institutions’ stranglehold by drawing links to a specific entrepreneur or, when a monetary crisis threatened any branch, by participating in the company’s financial and capitalistic consolidation.

What were the major differences between the takeoffs of the first and the second industrial revolutions? In both cases, we see the role played by funds generated in the preceding economic system and the investment of the fortunes made by the previous generation. The financial resources handed down by the past economy provided the life-blood for the new wave of innovation and the networks of family and friends were instrumental in the birth of the second industrial revolution. At the same time, the part played by wholesale traders, so decisive at the beginning of the nineteenth century, had all but disappeared in venture capital. Paradoxically, merchant banks were still very much in the picture because a number had continued to help, albeit in hesitant little jumps, an emerging branch or an innovative enterprise. In any case, they brought with them their network of investors (be it family wealth, a leading businessman or some company’s profits).

Also paradoxically, local banks participated in industrialization by mobilizing in their turn and at their scale, their network of regional investors to fund some company. Sometimes, they even formed part of “industrial districts” and from within the inter-company networks that sprang up in certain regions, helped the spread of innovation, technical processes, and capital funds. Thus, the “ancient” took part in the “modern.” It was the same with the enterprises that arose during the first

⁹⁷ Pierre Lanthier, “L’industrie de la construction électrique en France avant 1914,” in *Histoire de l’électricité en France*, ed. François Caron and Fabienne Cardot (Paris, 1991), 687.

⁹⁸ *Ibid.*

industrial revolution began diversifying and moving towards the new sectors opened up by the second industrial revolution. They reallocated funds gathered from the “ancient” productive system to further the growth of the “modern” productive system. The metallurgical, iron and steel, and especially, the chemical sectors turned out to be the most fertile ground for such a development. The investment and commercial banks, which had at the turn of the twentieth century attained the status of large enterprises, each had their own network of entrepreneurs and innovators, industrial groups that reoriented both themselves and foreign corporations wishing to spread their roots in France. With various interests, they took part in the industrialization move upstream—through risk-venture capital and more often development-capital—and they acted largely downstream thanks to their network of branches and individual investors for the deposit banks, which took on brokerage work for the investment banks.

They were the means by which the new enterprises issued their securities when they availed themselves of long-term external resources. In fact, even if the local stockbrokers, bankers, and notaries were involved in the marketing of securities, there was no “investment fund” in place at that time, in contrast to the third industrial revolution, which had at its disposal abundant resources in the form of venture and development capital. At the same time, their support of direct foreign investment and technology transfer was “modern” only at the scale of the capital mobilized. The first half of the nineteenth century had seen capital and technology from the Swiss, Belgians, and English help in industrialization. The novelty perhaps resides in the structure of the semi-industrial, semi-financial groups that formed around the holdings within certain European conglomerates (Belgian, Swiss, German, and sometimes American).

In any case, the new organization consisted of industrial “groups” that could independently manage their internal resources, sometimes helped by a “group bank,” which could also manage the capital and call upon the financial market. The modernization of metallurgy and chemistry was largely due to the formation of such groups that later also helped public utilities in the energy sector and electro-technology. The financial market’s massive growth completely overturned relations between innovation and investment. The rise in the stock market after the Great Depression, the advent of brokerage banking, the access to fortunes accumulated in the nineteenth century, and most importantly, the clear trend towards movable assets at the expense of immovable and land capital, were all factors that brought required funds into the new industrial sectors, as seen in the case of Saint-Gobain and the electric sector in the 1920s, and *Compagnie française des pétroles* in the 1930s.

Finally, we can ask: did the government’s role changed from one century to the next? It is clear that the “arsenal strategy,” which encouraged a neo-Colbertist “industrial policy,” introduced a new dimension in the petroleum and hydroelectricity energy sectors and the aeronautics and defense industries. The nationalistic customs policies also played their part by protecting the French manufacturers of automobiles,

steel tubes, and the chemical industry related to artificial textiles. The encouragement given by the state for training engineers also played an important role, but apart from some exceptions, it was the private sector that was the major determining force behind the emergence and consolidation of these new industries.

TABLE 2
Ancient forms of financing innovation: Personal or family capital

	Personal or Family Capital	Local Banks	Merchant Banks
Oil	Oil distributors from the 1860s involved in refineries and then selling their companies or involved in <i>Compagnie française des pétroles</i>		
Chemicals	Wholesale trader Gilliard into <i>Usines du Rhône</i> (1895) <i>Lumière</i> (photography, 1892) Family circles into Poulenc (1900) Gillet (classical dyeing products) into artificial silk (Izieux, 1904) then into chemicals (Progil, CTA) Georges Bergès (paper industry) and Hippolyte Bouchayer (mechanics) in electrochemicals (chlorates in Chedde, Savoy)	Cottet helping family glass firm Souchon-Neuvesel to amalgamate and modernize several plants in the Lyon area Charpenay in <i>Société des forces motrices de l'Arve</i> (electrochemicals, Chedde, 1895) <i>Banque privée</i> into Poulenc (1900) and partner of <i>Lumière</i> .	Vernes sole lender to <i>L'Air liquide</i> (1904) and then investor in its capital
Car	Berliet, son of a silk industrialist in Lyon (like Lavirotte, Audibert, Cottin & Desgouttes) Michelin' tyres development financed by classical rubber activities of the family company several cycles makers drifted towards car industry (Clément, Darracq, Richard, Peugeot, etc.) Delaunay, from boilers for ship, to cars (1904) Citroën from mechanics to car Renault helped by family capital raised through a textile	Guérin important banker of Berliet during WWI	Henri de Rothschild sponsored the creation of Unic by Georges Richard (1904) Mirabaud rescued Renault's credit and finances (1921-1929)

	Wholesale trade house		
Aeronautics	<p>Latham (cotton industry) in planes industry (1922)</p> <p>Deutsch de la Meurthe (oil business) in Astra (1908) then in Nieuport (Astra-Nieport, 1911); and also in <i>Compagnie générale de navigation aérienne</i> (1908)</p> <p>Potez self-financing his firm</p> <p>Bloch starting his firm thanks to capital from the family business in wood furniture</p> <p>Morane, Saulnier, Bréguet: sons of industrialists</p> <p>Blériot thanks to its business in parts for car industry (lights)</p> <p>Esnault-Pelterie thanks to family cotton firm</p>		Neuflyze in <i>Société générale aéronautique</i> (1929-1933)
Electricity utilities	Several hydro-electrical companies in Grenoble	<p>Evesque (Jacquier-Falcouz) in <i>Forces motrices du Rhône</i> (1892) and (with Saint-Olive) in <i>Compagnie lyonnaise d'électricité</i> (1886)</p> <p>Côte in <i>Société pour les applications industrielles de l'électricité</i> (1886)</p>	<p>Demachy-Seillière in <i>Forces motrices du Rhône</i> (Lyon, 1892)</p> <p>Mallet in <i>Force & Lumière</i> in Grenoble (1899)</p>
Electrotechnics	<p>Elissen (from <i>Banque transatlantique</i> and the Pereire family), cousins of Lazare Weiller, in <i>Tréfileries & laminoirs du Havre</i> (1897)</p> <p>Hippolyte Bouchayer (25,000 francs) and an engineer and friend (50,000 francs) invested in Merlin-Gerin (electrical equipment) in Grenoble (1919)</p>	<p>Cottet partner of the Swiss company Cortaillod to set up a subsidiary of electrical cables, <i>Câbles de Lyon</i> (1897-1917)</p>	<p>Elissen (from the Pereire family) involved in <i>Société industrielle des téléphones, Edison française et Tréfileries & laminoirs du Havre</i>,</p>
Steel industry			1880: De Wendel & Cie (Joeuf in Lorraine), with the Wendel and the Schneider and the Demachy-

			Seillière bank, Rothschild, and <i>Chemins de fer du Nord</i> in <i>Forges & aciéries du Nord & de l’Est</i>
Steel pipes		Dupont with Société de tubes de Valenciennes	Mirabaud, which studied the perspectives of growth of this sector (thanks to engineer Marchel Champin), godfathered (since 1909) <i>Forges de Recquignies</i> (created in 1907).
Electro-industries		<p><i>Société électrométallurgique française-Froges</i> (1888) (aluminium) welcomed in 1893-1894 investors and bankers from Lyon and Grenoble: (local banks Cottet and Morin-Pons, from Lyon; Charpenay and Rey, from Grenoble)</p> <p>Bougère (from Angers) with Keller & Leleux (electro-metallurgy in Rivet, Isère, 1901)</p> <p>Nicolet & Lafanechère (Grenoble) with Keller & Leleux (input of equity in 1927)</p> <p>Laydernier (Annecy) with <i>Electro-Chimie-Bozel</i> in 1919</p> <p>Laydernier (Annecy); Nicolet & Lafanechère, Charpenay, <i>Banque de l’Isère</i> (Grenoble): “industrial banking” policy</p>	

TABLE 3
Ancient forms of financing innovation: Innovation financed by the heritage of the previous industrialization

	Diversification of Industrialists	Spreading Groups: Suppliers	Spreading Groups: Customers
Oil	Saint-Gobain created <i>Compagnie des produits chimiques & des raffineries de Berre</i> (1928)		
Chemicals	<i>Comptoir des textiles artificiels</i> -CTA, from the Gillet group, and chemicals firm <i>Usines du Rhône</i> into Rhodiaceta (1924) (artificial textiles) The Gillet group into organic chemicals (Progil) CTA and Saint-Gobain in <i>La Cellulose du Pin</i> (1924)	Saint-Gobain and <i>Air liquide</i> cofounders of <i>Société chimique de la Grande Paroisse</i> (1919), with <i>Mines d'Aniche</i> and <i>Mines de Béthune</i> (ammoniac, azote, etc.).	
Car		Michelin taking over Citroën in 1934	
Aeronautics	Messageries maritimes into air carrier Air Orient, and into Chantiers aéronautiques de la Seine (1920), then Société provençale de constructions aéronautiques (1925) Penhoët financing Breguet (1933-1934) Renault from cars and mechanics to planes Lazare Weiler, from electrometallurgy and non-iron metallurgy in <i>Compagnie générale de navigation aérienne</i> (1908) and plant of Trignac		
Electricity utilities		<i>Énergie électrique du littoral méditerranéen</i> born in 1900 thanks to Thomson-Houston (electrical equipment) and <i>Grands Travaux de Marseille</i> (public works)	<i>Société lyonnaise des eaux & de l'éclairage</i> , railway PLM and electro-metallurgist Alais, Froges, Camargue in <i>Énergie électrique du littoral méditerranéen</i>

Electrotechnics	Textile and mechanics Koechlin in Société alsacienne de constructions mécaniques (SACM) Schneider into electrotechnics (Jeumont-Schneider in 1902 ; <i>Le matériel électrique Schneider-Westinghouse</i> in 1929)		
Steel industry	1880: De Wendel & Cie (Joeuf in Lorraine), with the Wendel and the Schneider 1880: <i>Aciéries de Longwy</i> (six companies) 1920: <i>Aciéries de Rombas</i> , by three firms (Marine, Micheville, Pont-à-Mousson)		
Steel pipes		Denain-Anzin godfathering <i>Tubes de Valenciennes & Denain</i> (1913) Châtillon-Commentry, Marine & Saint-Chamond in <i>Tubes de Montbard</i>	<i>Forges de Recquignies</i> gathered railway companies (PLM, Est), railway equipment firms (Dyle & Bacalan ; <i>Ateliers de construction électriques du Nord & de l'Est</i>), car makers
Electro-industries	Grammont (copper for cloth industrie) in copper equipment for electricity Delaunay-Belleville (boilers), SIT (cables) in CEM (<i>Compagnie électromécanique</i>) (1885)		
New commercial patterns	Paris stores companies diversifying towards popular stores chains Textile firm Pollet into retail distribution (<i>La Filature de La Redoute à Roubaix</i>)		

TABLE 4
Networks from the banking industry

	Investment Banks	Commercial Banks	Financial Banks
Oil	BUP and Paribas key bankers of <i>Compagnie française des pétroles</i> [see IV] Paribas and Standard Oil BUP with Petrofina and Shell	Crédit lyonnais and Crédit suisse co-financed <i>Compagnie des produits chimiques & des raffineries de Berre</i>	
Chemicals	Paribas with <i>Compagnie nationale des matières colorantes</i> (1916)		
Car	BUP key bank of Citroën in the 1920s	<i>Crédit lyonnais</i> rescued Berliet through financing and trust (1920s) <i>Crédit lyonnais</i> key partner of Renault since 1929-1930 <i>Société générale</i> , <i>Crédit lyonnais</i> and CNEP bankers of Peugeot since 1930	Rosengart, then Oustric key bankers of Peugeot (mid-1920s-1930)
Aeronautics		<i>Société générale</i> 's agency in Le Havre helping Latham	BNC financing Latham Bousquet-Gunzburg in Astra (1908) Small financial merchant banks (Bousquet-Gunzburg, Thalmann, Lubersac, Buurmans, <i>Banque transatlantique</i>) ; emerging and pushing middle-sized banks (CCF, BNC, <i>Banque des pays du Nord</i> , CFAT, <i>Société nancéienne</i>) in <i>Société générale aéronautique</i> (1929-1933) <i>Banque des Pays du Nord</i> financing Morane-Saulnier
Electricity utilities	Paribas and BUP partners of <i>Compagnie parisienne de distribution d'électricité</i> and of <i>Union d'électricité</i> , cornerstones of electricity in the Paris area	Crédit lyonnais as the founder and partner of <i>Société lyonnaise des eaux & de l'éclairage</i> (1881) <i>Forces motrices du Rhône</i> (1892) as the sole company	<i>Banque française de l'Afrique du Sud</i> as a partner of <i>Société normande d'électricité</i> then of <i>Compagnie générale d'électricité</i> (1898)

		godfathered (since 1896) by Crédit lyonnais before WWI, besides <i>Société lyonnaise des eaux & de l'éclairage</i> Société générale partner of <i>Compagnie générale d'électricité</i> (1898)	
Electrotechnics		CNEP with <i>Tréfileries & laminoirs du Havre</i> (1897)	<i>Banque internationale de Paris</i> with <i>Tréfileries & laminoirs du Havre</i> (1897) and companies competing Thomson (<i>Compagnie générale de traction</i> , etc.) Bénard & Jarislowski as main bankler of Empain in France
Steel industry	Paribas godfathering <i>Forges & aciéries du Nord & de l'Est</i>		<i>Banque française d'Afrique du Sud</i> and <i>Crédit mobilier français</i> with <i>Tubes de Montbard</i>
Communication	Paribas godfathering <i>Compagnie de radiotélégraphie sans fil</i> (CSF)		

TABLE 5
State networks

	Consensualist Capitalistic Groups	State and Mixed Capitalism	Regional Industrial Districts
Oil		<i>Compagnie française des pétroles</i> (since 1924-1930), with bankers and oil distributors	
Chemicals	Paribas, Kuhlmann; Lambert-Rivière with <i>Compagnie nationale des matières colorantes</i> (1916)	ONIA: state company (1922)	
Aeronautics		Huge benefits during WWI thanks to state orders The state financing planes makers through subsidies and advances on orders (from the 1928 plan) Air France (1933)	
Electricity Utilities		<i>Compagnie nationale du Rhône</i> (established in 1929-1932)	
Electrotechnics			The Grenoble area: community of sectors involved in the development of hydro-electricity and its use
Steel Industry	<i>Forges & aciéries du Nord & de l'Est</i> (Paribas ; Rothschild et <i>Compagnie des chemins de fer du Nord</i> ; <i>Chemins de fer économiques</i> ; <i>Mines de Lens</i> , etc.).		
Communication		State monopole on telephone grid	

TABLE 6
Foreign direct investment

	Foreign Industrialists	Foreign Banks	Foreign Holdings
Oil	Standard franco-américaine Subsidiaries of Shell Petrofina		
Chemicals	Solvay set up subsidiaries in France (since 1872)	Two Swiss bankers (Diodati & Duval, Geneva; Von Ernst, Berne) in <i>Société des usines chimiques du Rhône</i> (1895)	
Car	Morgan Harjes and Lazard conceived projects of mergers of Citroën and GM and Ford		
Aeronautics		<i>Banque commerciale de Bâle, Banque franco-suisse</i> and bank Bernheim (Bâle) in <i>Compagnie générale de navigation aérienne</i> (1908)	
Electricity Utilities	Empain with several utilities (<i>Chemin de fer métropolitain de Paris, Électricité de Paris, Tramway Nord parisien</i> , etc.) Compagnie française Thomson-Houston: several subsidiaries (Énergie électrique du littoral méditerranéen, Énergie électrique du Sud-Ouest, companies of tramways and of production) Westinghouse France; failure; association with Schneider: <i>Le matériel électrique SW</i> (1929) Brown Boveri & C° in CEM (<i>Compagnie électro-mécanique</i>) The Belgian Empain group took over a company in Jeumont (1904) which became in 1906 <i>Ateliers de constructions électriques du Nord & de l'Est</i> then in 1921 <i>Forges & Ateliers de constructions électriques de Jeumont</i> (or Jeumont)	Swiss UBS in <i>Énergie électrique du littoral méditerranéen</i> (1900) Swiss Elektrobank (in the 1920s)	Geneva financiers (Boissonnas) in <i>Force & Lumière</i> in Grenoble en 1899-1923 holdings linked with Compagnie française Thomson-Houston: <i>Compagnie centrale pour l'énergie électrique, Société centrale pour l'industrie électrique, Sofina</i> , etc.

Electrotechnics	Empain with <i>Ateliers du Nord & de l'Est</i> (Jeumont) and <i>Société parisienne pour l'industrie électrique Compagnie française Thomson-Houston</i> : several subsidiaries		
Steel industry	German company Thyssen developing iron mines and a steel plant in Normandy (Caen) (up to 1914)		
Steel pipes	A few Belgian industrial dynasties industrielles involved in some companies (Escaut & Meuse, 1882; Louvroil, 1890)		

FIGURE 1

Money provided by the first industrial revolution as leverage to the second industrial revolution: Investors mobilized

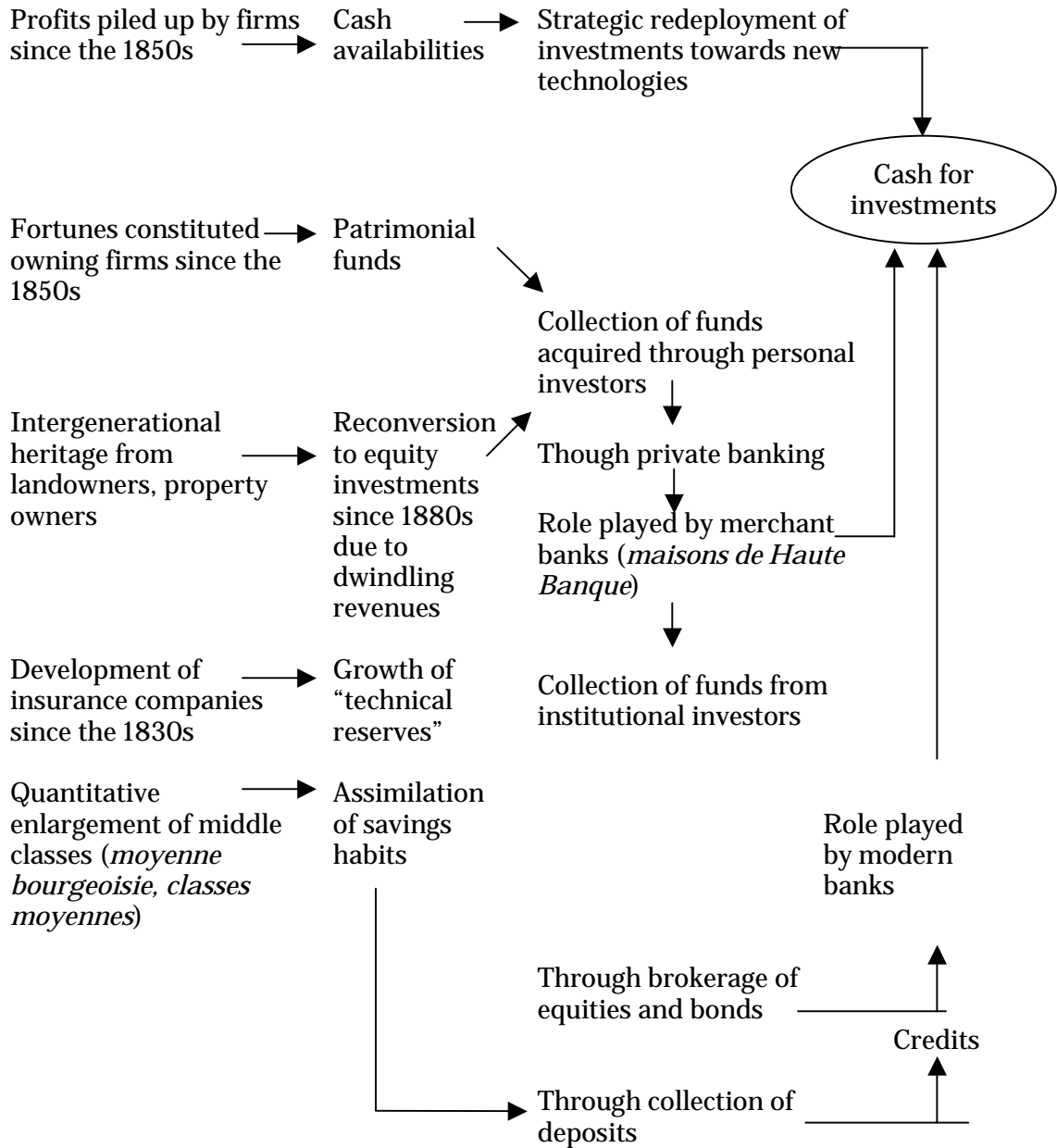


Figure 2. The stages of growth for start-up companies of the first times of the second industrial revolution and the need for cash

