Manufacturing Strategies in the Eighteenth Century: Subcontracting for Growth among Papermakers in the Auvergne

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From the sixteenth century to the end of the eighteenth century, the papermakers of Ambert (Auvergne, France) remained the leading producers of quality printing paper in Europe. During the second half of the eighteenth century, they expanded greatly their production in response to a dynamic market. This success was achieved not through the adoption of new methods or the expansion of enterprises but through subcontracting practices. This article explores the conditions that fostered such strategies. It confirms the multiplicity of options available to early modern manufacturers but suggests that the socioeconomic characteristics of each community of producers conditioned their choices.

Recent studies of European industrialization have refined greatly our understanding of the transition period once decidedly known as the Industrial Revolution. Researchers have acknowledged the advances made in the early modern period as well as the gradual and uneven pace of the transformations that followed. In studies of entrepreneurial strategies, the resilience and even modernity of forms of enterprise once thought to have become rapidly obsolete have brought the long-standing concept of the "triumph of the factory system" into disrepute. The acceptance of the possible "coexistence of multiple successful paths to profit and accumulation" has opened the way for a less "linear" understanding of economic growth.[1]

The present study investigates the plurality of strategies available to a group of eighteenth-century manufacturers faced by a growing demand and the context in which their decisions were reached. The mills of Ambert in a central province of Old Regime France, the Auvergne, had been Europe's largest producers of quality paper since the early sixteenth century. During the second half of the eighteenth century, as many of their competitors adopted new methods of production and expanded the scale of their mills,

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[1]This last expression is found in Scranton, *Proprietary Capitalism*, p. 4. Among recent works summarizing the debates, rephrasing the questions raised, and introducing the reader to a vast bibliography, one may cite Hoppit, "Counting"; Higgonet et al., *Favorites*; Crafts and Harley, "Output Growth"; Mokyr, "Editor's Introduction"; and Berg, *Age*.

the papermakers of Ambert shied away from these transformations and responded to the demands of their markets by embracing subcontracting practices. This study explores the factors that made this strategy the solution of choice. It demonstrates the centrality of social and economic structures in the shaping of manufacturers decisions. We begin, however, by situating the mills of Ambert in the context of their industry and its evolution.

PAPERMAKING IN THE AUVERGNE

The principles of papermaking had been familiar to the Chinese for over a thousand years when its techniques were adapted to European needs and resources in Italy during the thirteenth century. They would endure essentially unchanged for five centuries, although incremental advances regularly lowered the cost and raised the quality of paper.[2] From the end of the fifteenth century to the nineteenth century, France remained the leading producer of this commodity. At the apex of the regional hierarchy, from the sixteenth century to the Revolution, stood two cities of a mountainous and poor province, the Auvergne. Thiers, one hundred kilometers west of Lyon, specialized in the making of writing paper. Forty kilometers further south, clustered in three narrow valleys, the mills of Ambert supplied printing paper to the most famous presses.[3] This study focuses on the largest of these centers, Ambert, and on the last century of this celebrated era.

Papermaking was an important industry in France. Ambert accounted for over ten percent of the kingdom's production and specialized in quality paper known across Europe.[4] Papermaking in Ambert was the domain of medium-sized enterprises. A majority of mills were driven by two waterwheels, although several papermakers controlled up to seven or nine wheels. Papermaking was characterized by an advanced division of labor and a care-

[2]Fermented linen and hemp rags provided the constitutive element of paper, cellulose. Shredded and fermented, the rags were crushed by a calibrated series of water-driven stampers. The resulting pulp was diluted and warmed in a large vat. The sheet was formed by dipping into and lifting out of this vat a flat metallic screen. The watermark, a brass thread bonded to this "mould," identified the producer. After being laid between layers of felt and pressed, the sheets were hung to dry. They were eventually sized in a gelatine bath, pressed and dried again, and finally polished and sorted for shipment. Detailed and illustrated eighteenth-century accounts of papermaking are found in the *Encyclopédie*; de La Lande, *Art*; for a concise introduction in English, see Coleman, *British Paper Industry*, chap.2.

[3]De La Lande sketched the hierarchy of French paper-producing regions at midcentury (*Art*, pp. 85–87). A 1691 inventory of the stocks held by the *Imprimerie royale* reveals the preeminence of Ambert paper (Bibliothèque nationale [hereafter BN], *Nouvelles acquisitions françaises* 2611). Writing required a harder, more waterproof surface than printing, and thus increased sizing.

[4]At the end of the *Ancien Régime*, Arnould gave the following estimates: linen industry: 161,250,000 livres tournois (lt); woollens: 92,500,000 lt; *papermaking: 7,200,000 lt*; leather and fur: 6,000,000 lt; soap making: 5,000,000 lt; sugar refining: 4,800,000 lt (*De la balance*, p. 221). The Dupuy mills of Ambert shipped paper to London, Berlin, Amsterdam, and other places. Their best customers were Parisian printers but they also served such demanding clients as the *Académie des sciences*, engravers, and map makers (Archives départementales du Puy-de-Dôme [hereafter AD 63], Dupuy account books, 2 E 519, 520, 521).

ful coordination of tasks, several of which required well-developed skills. This was an expensive industry in which to engage. During the eighteenth century an average mill in Ambert, served by 10 to 20 workers, immobilized an investment ranging from 10 to 20,000 livres tournois (lt). The valleys of Ambert sheltered some of the foremost papermakers in France, employing close to one hundred workers of both sexes. Registered yearly sales could reach above 100,000 lt, but were below one-fifth of that figure on average.[5]

Rising foreign competition made the eighteenth century less than idyllic for French papermakers. Nevertheless, on the eve of the Revolution, France, the Auvergne, and Ambert all produced more paper than ever before. This was made possible by a large increase in paper consumption. It has been suggested that per capita consumption of white and coarse paper almost doubled from 1715 to the end of the century in England, a trend compounded by the demographic expansion of the period. Although it is not possible to quantify the rise that took place in France, it would be difficult to argue that it did less than reflect the commercial, administrative, and literary dynamism of the period.[6]

The papermakers of Ambert fully benefitted from this rising demand. Nevertheless, they experienced two difficult periods: the first during the last decades of the reign of Louis XIV, and the second during the 1740s and 1750s. The output of all Ambert mills is known in a detailed, if irregular, fashion from 1738 onward. Table 1 shows that from a low of less than 400 metric tons a year at midcentury, production almost tripled before the end of the 1770s. Earlier data suggest that this sharp increase was itself part of a century-long pattern of growth: from the early 1680s to the late 1770s, the mills' output in weight was at least multiplied by five.[7] The same data suggest a willingness, on the part of papermakers, to minimize the impact of the market's fluctuations upon their numbers. Through at least seven decades of the eighteenth century, the number of active mills and waterwheels varied relatively little (Table 2 and 3).[8] Between 1750 and 1776, for instance, an

[5]The capitalization of papermaking is documented in other national contexts in Duplessis, "Capital," and Thomson, *Paper Industry*, chap.4. For sales figures, see the Dupuy account books and AD 63, 1 C 520, 532. Circulating capital could double the figures quoted here, which include the land held by most papermakers.

[6]Coleman, *British Paper Industry*, pp. 15,105. For the situation in France, see Martin, "*Librairie française*," pp. 116–17, Popkin, *Revolutionary News*, pp. 16–19, Patrick, "Paper," pp. 1–2. Increased consumption of paper was reflected in the rising cost of rags (see below).

[7]Over this century, the annual value of the paper produced in the Auvergne climbed from 240,000 lt to over 1,100,000 lt, while the price of paper only slowly and partially recovered from a sharp drop early in the eighteenth century. Output figures in Boissonade, *Le triomphe*, p. 23; AD 63, 1 C 504, 506, 511, 520, 524, 526, 530, 532, 613, L 2917; Poitrineau, *Puy-de-Dôme*, p. 193. Paper and rags prices in the Dupuy account books from 1687 to 1780 (see note 4) and an account book from the mills of P. Berger at Thiers, for the last decade of the Old Regime (AD 63, 3 J 42).

[8]The number of papermakers and waterwheels at work was recorded yearly for fiscal purposes from 1730 to 1760 (AD 63, B IS series, arranged by parishes) and, less regularly but throughout the century, in administrative reports (AD 63, 1 C 485, 491, 504, 506, 511, 520, 530, 532, L2917).

TABLE 1
AMBERT PAPER OUTPUT, 1738–1802

Year	Output (metric tons)
1738	637.8
1740	507.0
1742	473.1
1745	411.1
1749	415.2
1750	366.9
1757	577.3
1758	476.5
1761	635.2
1762	657.0
1769	780.0
1770	851.9
1772	830.0
1776	945.5
1795	920.8
1802	1,050.0

Source: See the text.

increase of 158 percent in the weight of production was obtained by a 47 percent rise in the number of wheels at work, the ranks of papermakers only swelling by 15 percent. During the previous slump, around 1740, they had limited their production in a reverse manner.

The overall dynamism of the paper industry in Ambert during the last two reigns of the Old Regime is reflected in the prosperity of its participants and their attachment to the trade. Fiscal rolls, as well as notarial evidence of solid agricultural wealth and other investments, such as the purchase of seigneurial rights, testify to the financial strength and agility of many papermakers. However, they show no tendency to abandon the manufacture of

TABLE 2
DISTRIBUTION OF ACTIVE WATERWHEELS BY SIZE OF MILL, 1738–1795

Year	One Wheel	Two Wheels	Three Wheels	Four or More Wheels
1717	0	30	15	14
1731	9	24	39	22
1735	5	38	33	24
1740	11	30	18	20
1742	3	40	21	21
1743	4	36	21	22
1745	3	46	12	14
1750	6	44	12	6
1754	6	36	24	15
1758	8	30	12	26
1772	8	32	18	36
1776	8	36	12	44
1795	11	36	18	39

Source: See the text.

TABLE 3
PAPERMAKING ENTERPRISES IN AMBERT, 1717–1795

Year	Number of Enterprises
1717	22
1731	37
1735	39
1740	35
1742	34
1743	33
1745	33
1750	33
1754	35
1758	33
1772	37
1776	38
1795	42

Source: See the text.

paper for the land, or any other form of disinvestment. This is an important point in the light of a noted inclination of French (and other early modern) manufacturers or merchants to opt for a *rentier* life-style. Tax rolls show that the nonpapermaking activities of Ambert mill owners evolved in the same direction as their manufactures. The purchase of land or titles (which, in turn, provided loan guarantees and fiscal relief, as well as some essential supplies) accompanied periods of expansion of the industry, while their sales helped weather downturns.[9] In Ambert, land holdings and other avenues of safe investment were important and intimately linked to the fate of papermaking enterprises. However, they must be seen as playing a secondary, supportive role, rather than a powerful incentive to deindustrialization.[10]

The business decisions explored in the following pages must be understood to have been conceived in a dynamic context. Three centuries after having lifted these valleys out of their pastoral anonymity, papermaking retained a great deal of appeal for its practitioners. The papermakers of Ambert, as many other entrepreneurs before and after them, could reasonably hope to both secure their fortunes and exploit opportunities offered by a growing market. To that end, they could adopt new techniques and practices or expand their firms, as did many of their competitors. This, the manufacturers of Ambert did not do. Instead, they put their faith in the methods

[9]This pattern can be documented not only in a few particular cases (see for instance the massive land sales accompanying the difficulties encountered by the Gourbeyre family of Noyras at mid-century: AD 63, *notaires* Ponchon, May 3, June 22, 1741, August 30, 1751; B. Friteyre, April 28, 1752; Herbier-Laroche, Jan 4, 1779, July 5, 1752, and so forth), but in a general study of tax rolls: knowing the (varying) rate of imposition of a papermaking wheel and the number of wheels at work in each mill, it is possible to chart the fluctuations of the nonpapermaking holdings of mill owners (fiscal rolls in AD 63, B IS). This supportive role of land is general here, although accentuated among the wealthiest, perhaps because of the greater attachment of smaller producers to their meagre holdings.

[10]This understanding runs somewhat contrary to Estier's affirmation, based on a few particular cases ("La crise," pp. 196–99).

they knew, the size of enterprise that had proven most resilient through previous crises, and the links that existed among their own hierarchy of producers.

AMBERT PAPERMAKERS AND THE TRANSFORMATIONS OF THEIR INDUSTRY

The strategic choices made by Ambert papermakers may first be contrasted with the adoption of new methods of work elsewhere in their industry. A definitive renewal of the paper industry would await the adoption of the continuous paper machine after 1820.[11] Characteristically, however, the eighteenth century saw smaller innovations raise the production and productivity of mills, as well as the quality of paper. In return, these advances demanded notable but affordable investments, sustained efforts to build and maintain finer, more complex machines, and the alteration of established routines.

The most significant improvement in papermaking in the eighteenth century was the adoption of the "hollander beater." This machine of Dutch origin replaced the stampers designed five centuries earlier with a cylinder armed with blades and enclosed in a tightly fitting vat. Well adjusted, it reduced the rags to a pulp so effectively that the fermentation stage could be by-passed. More incremental efficiency gains were achieved through an increasing use of metal in the construction and assembly of waterwheels or the indispensable great presses. Papermakers also experimented with new sizing methods, learned to better control the drying process, and improved the final smoothing of the sheet of paper. They adopted the British invention of "wove" paper, better suited to the printing press because of the absence of the parallel lines characteristic of "laid" paper. Some innovations required, above all, a greater labor investment. This was the case of a technique known as the *échange*. Also of Dutch origin, it increased the number of times paper was pressed, requiring more handling of the sheet.[12]

The difficulties and successes encountered by French papermakers in mastering these innovations are documented.[13] The reluctance of Ambert

[11]Invented in France by N. L. Robert in 1799, this machine was improved in England under the name of Fourdrinier, where a dynamic wallpaper market demanded the large sizes it could deliver (Hills, "Development"). It returned to France two decades later where it promptly transformed the industry (André, "La papeterie").

[12]Accounts of the advances mentioned here in de La Lande, *Art*, passim; Audin, "*De l'origine*"; Ballot, *L'introduction*, pp. 555–58; Cabanes, "*L'état*"; Creveaux, *Les anciennes papeteries*, pp. 11–17, "Un grand ingénieur," p. 66 and *L'industrie*, pp. 5–6 ; and van Riesen, "Les débuts," p. 180. Archival documentation in AD 63, 1 C 489, 493, 499, 504, 510, 526, 532, 535, 538, 3406; Archives départementales de l'Hérault [hereafter AD 34], C 2678.

[13]The most thoroughly studied case is that of the Montgolfiers of Annonay (Reynaud, *Les moulins*; Rosenband, "Work"; or, for a short but perceptive account, Gillispie, *Science*, pp. 444–59; and AD 34, C 2678, 2679).

manufacturers to follow suit stands in contrast. Whereas more than one hundred hollanders were at work in France by the fall of the Old Regime, none was preparing pulp in Ambert. The installation of hollanders and the production of wove paper are mentioned in Ambert for the first and only time in 1785 in a mill that was destroyed shortly after, and a government report did not include this center among those having mastered the practice of the *échange* in 1779. Nor did these mills figure, a few years later, among those said to have experimented with a new process to smooth the surface of paper, a goal of particular interest to the makers of printing paper. Similarly, no attention was paid to improving the efficacy of waterwheels, in spite of the weakness of these valleys' streams. By 1788, the newly installed *Assemblée provinciale* officially worried about the great contrast existing between the Auvergne and its competitors with regard to the adoption of new methods to produce paper.[14]

The lack of interest shown by Ambert papermakers toward these innovations became evident during the last decades of the Old Regime, when the government embarked on a vigorous campaign to renovate the industry. As early as the 1740s, Versailles had arranged for the on-site testing of numerous projects. These experiments generally took the form of "joint-ventures" between papermakers and various personalities endowed with official recognition for the occasion. Because of its leading position, the Auvergne was chosen for several such missions around midcentury. None appears to have been a success, and a few probably left long-lasting scars in the minds of papermakers after some of their colleagues lost substantial sums in the venture.[15] When over the following decades Versailles became more forceful in its efforts to bring innovation to the French paper mills, Ambert manufacturers shied away from its offers. Although the monarchy was often generous in its support to innovators, granting for example 18,000 lt to the Montgolfiers of Annonay for their 1781 efforts, no Ambert papermakers even applied for such help, in spite of repeated official encouragements. Their silence stands out in a general clamor for subsidies, some demands emanating from remarkably small mills operating in the Auvergne secondary centers.[16] Paris also delegated expertise. N. Desmarest, the *Inspecteur*

[14]BN, *Manuscrits français*, henceforth m.f., fo.360 (March 31, 1785) among a series of articles in the *Journal de Paris*. The mention of a hollander and wove paper is found in a request for relief by Tamisier *père et fils* who claimed to have just completed these improvements when fire ravaged their Boys plant (AD 63, 1 C 538). On October 18, 1788, the Provincial Assembly speculated on the means to bring hollanders to Ambert (AD 63, 1 C 7366). Among the successful improvements recorded in Ambert, the practice of a slower drying process yielding a smoother sheet.

[15]See AD 63, 1 C 504, 513, 514, 515, 521, 522.

[16]See the efforts of Jubié, local *Inspecteur des manufactures* to invite Ambert papermakers to apply for state funds in AD 63, 1 C 526, 532 535 (1771–1781). Many other examples of subsidies are known across France. For the applications emanating out of the small Auvergne centres of Tallende and Chamalières, see AD 63, 1 C 526, 536.

général des manufactures who paid much attention to this industry, sent a remarkable engineer, J.-G. Ecrevisse, to renovate mills in many regions. Yet no invitation called him to the Auvergne.[17]

A second measure of the distinctiveness of the Auvergne is the absence of very large units of production. Admittedly, until the advent of the continuous paper machine, these plants could only be instances of "non mechanized factories," since the use of the new techniques described above did not fundamentally change the nature of papermaking.[18] The advanced division and coordination of the tasks of papermaking had long favored the concentration of production in mills that were, for the period, substantial establishments. Ambert itself was the site of at least one very large mill, housing seven waterwheels under its roof, employing several dozen people and valued at well over 50,000 lt.[19] Such figures were respectable, but by the middle of the eighteenth century, other regions witnessed the creation of mills costing several hundred thousand *livres tournois* and employing hundreds of workers. The construction of such mills offered a chance, naturally, to create rational structures, freed of the constraints of the more organic growth of previous centuries. The choice of the magnificent mills of Langlée, opened in 1745 near Montargis, to illustrate the *Encyclopédie*'s section on this trade is telling in this regard. In the vast European paper market, economies of scale attracted many well before the introduction of the paper machine but failed to interest Ambert mill owners.[20]

Other papermakers chose a more traditional way to expand the scale of their affairs. As early as 1734 an attempt was made to create an impressive cartel in the Angoumois, involving up to twelve mills. It signaled the renaissance of this region's papermaking industry. Several decades later, the Delagarde brothers successfully assembled several large mills under their

[17]The role of J.G. Ecrevisse (of Dutch and French extraction) illustrates the importance of human contact in the diffusion of new practices. Desmarest wrote two treatises on the modernization of papermaking after investigating the matter in Holland (1775, 1778). They were widely distributed, notably in the Auvergne; Desmarest also visited the area (Creveaux, "*Un grand ingénieur*"; and AD 63, 1 C 525, 531, 533).

[18]The place of nonmechanized factories is considered in the exchanges that have, over the past decades, analyzed the reasons behind the emergence of factories (summary in Mokyr, "Editor's Introduction," pp. 110–18). Not only have small units played an important role in the development of many sectors (O'Brien and Keyder, *Economic Growth*; and Nye, "Firm Size"), but recent work has even questioned our understanding of the scale of production in industrialized countries (Kinghorn and Nye, "Scale").

[19]Located at Grandrive, it belonged to the Dupuys (see Apcher, *Les Dupuy*; and J.-J. Dupuy's testament, *notaire* B. Friteyre, April 8, 1747).

[20]The multiplication of such large units suggests that in the context considered here, economies of scale were not exhausted as rapidly as in an early American context (Sokoloff, "Was the Transition"). The mills of Langlée were estimated in 1745 at 800,000 lt (Gachet, "L'apparition," p. 20). The neighboring mills of Buges, founded in 1787, employed 400 workers and immobilized 600,000 lt in 1794 (Gerbeaux, "La papeterie," pp. 53–68,80). Ballot noted the 1788 opening of a 354,000 lt mill at Sisteron, suggesting that a mountainous location was no obstacle to a large investment (*L'introduction*, p. 557). In Scotland, see Thomson, *Paper Industry*, p. 85.

rule in the vicinity of Paris. By the 1780s, the Montgolfier family alone controlled (over three provinces) a production equivalent to one third of that of all the Ambert mills.[21] Ambert papermakers never built such multimill empires. In fact, we know of several instances during the eighteenth century of families limiting their holdings to three or four adjacent mills, a scale of expansion already reached by the end of the seventeenth century.[22]

It must be noted that none of the transformations examined here were beyond the reach of several prominent local families, who remained among the elite of producers. The best documented examples of modernization—the word referring simply to the previously mentioned innovations—are found in neighboring Annonay. Until the 1770s the Montgolfiers were of a stature comparable to that of several Ambert manufacturers. Their neighbors, the Johannots, who followed a comparable trajectory at a slightly lower level, were also of modest renown until then.[23] Nothing in the nature of the emerging innovations made them particularly ill-suited to Ambert mills. The government had released manufacturers from the obligation to use traditional processes in 1763, a policy ignored for almost two decades. The prejudice against paper made with hollanders had lost its standing, and, most telling, mills of all categories were able to master their installation.[24]

[21]Gachet, "L'apparition," pp. 14-24; Gerbeaux, "La papeterie," p. 26; Creveaux, "Les anciennes papeteries," p. 9; Reynaud, *Les moulins*, pp. 61–63. The Essonnes mills near Paris employed 300 workers (Hills, "Development," p. 24).

[22]The Dupuys sold several mills they had come to own through marriages and inheritances early in the century, focusing instead on their Grandrive plant. At midcentury, the Gourbeyres shed two mills, reducing their holdings to three units. What was perhaps the largest firm at the close of the seventeenth century, belonging to the Sauvades, was dismantled through a succession of *partages* among siblings. Other instances of such practices were uncovered through a systematic analysis of sales and successions.

[23]Before the expansion noted above, the Montgolfier mills and lands at Annonay were estimated at somewhat over 100,000 lt, their sales only slightly exceeding those of the Dupuys (Reynaud, *Les moulins*, pp. 215–23, 237). Furthermore, the setting of Annonay is similar to that of Ambert. Situated on two opposite slopes of the eastern ridges of the Massif central and separated by a mere one hundred kilometers, the two cities faced similar obstacles shaping and supplying their mills and shipping their paper. A semi-official report to Paris of the transformations of the Montgolfier and Johannot mills noted both the unimpressive scale of existing structures and the scope of improvements undertaken (BN, m.f. 22188, fos. 354–366).

[24]BN, m.f. 22082, fo.76. By 1788 the *Assemblée provinciale* clearly agreed that hollanders were essential to the reputation of leading producers (AD 63, 1 C 7366). The 1776 comments of de La Lande on the qualities of paper still carried the distinction between the "beauty" of paper and its "goodness" (or resistance; see a 1729 comment by Ambert papermakers, BN, m.f. 22188, fos. 307–309). But the reference to the fragility of Dutch paper was minimized and attributed to the nature of the water (*Art*, pp. 80–82). Such machines were installed before the Revolution in Provence (1768, Isnard, "Les papeteries," pp. 43–44), Normandy (AD 63, 1 C 7366), and many other minor papermaking centers such as Uzès, Castres, Vienne, Franche-Comté, and so forth (Ballot, *L'introduction*, pp. 557–58; Creveaux, "Un grand ingénieur," p. 66). A low energy supply may well have been the most serious physical limitation faced by Ambert papermakers. There is, however, no evidence that it precluded their use of at least small hollanders. On the contrary, it has been suggested that their rotary motion made them more suitable to the relatively low power supplied by the Dutch windmills where they had been conceived (Blanchet, *Essai*, p. 150). In this crowded setting, the buying of neighboring water rights could have improved the situation of leading producers.

Throughout the last decades of the Old Regime, Ambert papermakers distinguished themselves by showing very little or no interest in the innovations spreading among many of their colleagues, and no willingness to expand the scale of their operations, either through the building of very large mills or the concentration of several mills in a family structure reaching beyond the scale of operation familiar to these valleys. This does not mean that they were not eager to take advantage of the growing demand characteristic of the period. However, they strove to do so within the traditional structure of their valleys.

THE AMBERT SOLUTION: SUBCONTRACTING

The mostly medium-sized units using traditional methods that characterized Ambert were not facing the paper market alone. This community of producers was structured around large and flexible subcontracting networks focused on a handful of leading enterprises. Such links are brought to light through two analyses, one of the local credit structures and the other of a series of explicit contracts, and illustrated in the case of one network.

A Credit Structure Centered on a Few Papermakers

An analysis of Ambert papermakers' major debts (of the order of thousands of livres tournois) revealed a distinct credit structure, dominated not by outside merchant interests, but by a few local papermakers. Early modern manufacturing depended to a great extent on commercial capital for financing, and in many areas papermaking appears to have followed this pattern.[25] Merchants did invest in papermaking in Ambert, but over the last two reigns of the Old Regime, they accounted for only one-third of the credit extended. They left this central role to a handful of important papermaking names.[26] This pattern is confirmed by a complementary analysis bearing on smaller debts revealed in front of the *Justice consulaire*, a tribunal devoted

[25]The clearest examples are found in the Périgord and the Angoumois, where papermaking was financed by Bordeaux merchants and their Dutch rivals (van Riesen, "Les débuts," pp. 196–99; and Nicolaï, *Histoire*, pp. 155–66). Their role in Thiers also led to their ownership of several mills (Estier, "La crise," pp. 192–94; and AD 63, 1 C 504, 505, F 0 251). For the role of merchant capital in industrial activity, see, for instance, Léon (in Labrousse et al., *Histoire*, pp. 613, 617).

[26]We will see below that a high ratio of owner-operated mills corresponded to this low influence of commercial capital. Among 114 documented debts of the order of thousands of livres tournois owed by papermakers, 75 were owed to other Ambert papermakers, and, of these 75, 57 were held by seven important papermakers, with 15 other papermakers holding the remaining 18. The magnitude of such debts must be seen against the average production of a mill valued at less than 20.000 lt (references in note 5). In the Angoumois, the "*cabal*," the traditional loan from the owner to the tenant papermaker, amounted to 3,000 lt (Lacroix, *Historique*, pp. 35–38). The proportions remain the same if one computes the amount of the debts rather than their number. Most debts held by outsiders were owed to six Ambert merchants with family links to major papermakers. Debts are stated in a variety of sources, notably inventories.

to modest commercial disputes: the majority of suits were initiated by the very same large creditors.[27]

It may be noted that there is only a slight tendency for papermakers to lend to their immediate neighbors, that is, papermakers of their own valley, and that the bonds drawn between the major lenders and the borrowers were not exclusive. One could turn to several of the important lenders to finance one's operations.[28] Most often, the nature of the debt is hidden behind such terms as *billet* and *promesse*, referring to promissory notes. When details are available, we see advances of funds or raw materials. A series of notarized contracts further exposes the links woven around a few respected families of this trade.

Formal Subcontracting

Beginning in the 1750s notarial and judicial archives yield a growing number of explicit contracts between a borrowing papermaker and a lender. Typically, in these *traités*, a modest papermaker states an inability to buy the necessary raw materials. The other signatory offers help, demanding to be repaid in paper. The quality, quantity, and price of the paper that the advance will finance are agreed upon and a term fixed to the agreement. From 1754 to 1790, we encounter 25 such contracts, linking 14 lenders to 21 borrowers. Of 14 lenders, ten were papermakers, who signed 18 contracts. All ten were important producers, among whom are the seven most frequent lenders previously observed. The remaining three were less active but still noted lenders.

We shall see that the practice of subcontracting predated 1754. However, a close reading of the treaties reveals a growing trend and the formalization of what had been an oral or private deal. In breach of the secretive habits of this milieu, several contracts were not only notarized but also registered with the local justice to ensure public awareness of the transaction. In a perhaps rhetorical fashion, both sides insisted on their reluctance to enter into such a contract. The borrowers explained that a sequence of unusual circumstances, such as war, illness or an unexpected rise in the cost of doing business, forced them into the deal. Most often they claimed to be in this predicament for the first time. The lenders appear just as cautious, limiting the contract to a maximum of three years and often less, trying to forecast any circumstance that could justify its cancellation, and asking for a solid guar-

[27]Between 1762 and 1790, 15 of 19 suits were brought by these leading papermakers. These suits refer to debts of 600 lt on average. (AD 63, B AM 24).

[28]See, for example, the case of Benoît Baillot, who was forced by his creditors to sell his mill (auctioned for 26,400 lt). They were led by J. Gourbeyre (owed 7,000 lt), A. Richard (17,134 lt), and B. Vimal (6,866 lt), three of the most important papermakers of Ambert (AD 63, *notaire* Ponchon, September 28, 1795).

antee such as land. All treaties mention the need to frequently render precise accounts of the sums received and paper produced and the wish to resolve disputes by arbitration.[29]

Subcontracting practices had existed before 1754, when we find the first contract detailing them. In 1731, when the monarchy was regulating the profession, some papermakers had decried such *monopoles*, asking that one be only allowed to sell his or her own paper. In fact, the rules proposed in 1727 for the Auvergne and confirmed on a national scale in 1739, forbade only the sale of paper made in another mill under one's own watermark.[30] One instance of systematic subcontracting confirms that the practice existed before 1754 and outside the contracts uncovered: the Dupuys, who did not sign any of the contracts found, sold a great deal of paper made elsewhere.

Making Paper for the Dupuys

A network of mills supplied paper to the preeminent papermaking dynasty of Ambert, the Dupuys. Long considered the most impressive in France, their Grandrive mill was powered by seven waterwheels. Its owners had assembled a vast agricultural domain and invested in two seigneuries and an office of *Secrétaire du Roi*. Their account books show that from 1739 to 1770 they annually bought as much as 40 percent of the paper they sold from other papermakers of lesser importance (Table 4).

During these 32 years the Dupuys sold paper purchased from nine other mills. The number of these suppliers fluctuated yearly from one to six. The most faithful among them, the Nourisson mill of Thamiat, served the Dupuys for 29 years, and another one for 18 years. Many proved less satisfying, less needed, or less interested, only delivering paper to Grandrive during a few consecutive years. The value of paper subcontracted varied each year from a few thousand livres tournois to over 60,000 lt, always representing a sizable portion of the production of the supplying mills. We do not know why these accounts failed to note the origin of paper sold after 1770. However, there is no doubt that the practice continued. In 1779 the testament of Pierre Artaud of the mill of Frédière-Basse, mentions the shipping of paper to the Dupuys.[31] Finally, it may be noted that the Dupuys

[29]Examples in AD 63, B AM 26: Vimal-Sauvade (February 5, 1776), Sauvade-Artaud (October 2, 1780) and Pourrat-Filliat (January 21, 1786); *notaire* Maignet, Lebon-Gourbeyre, May 28, 1776, Lebon-Perrodon, April 7, 1783, Artaud-Perrodon, April 28, 1777, Baillot-Perrodon, August 9, 1784.

[30]AD 63, 1 C 493. By the second half of the eighteenth century, few lenders demanded paper made to their mark.

[31]Anne Nourisson of Thamiat delivered paper worth 4,356 lt in 1748, 3,881 lt (1749), 4,734 lt (1750), over 10,000 lt (1751), 6,717 lt (1752), 9,004 lt (1753), and so forth. In 1758 and 1776, the output of Thamiat was valued, perhaps conservatively, at 8,000 lt and 14,445 lt (AD 63, 1 C 520, 532). The fact that the Dupuy sales peaked during the 1750s, when Ambert output was most depressed, is easily explained. The principal rival of the Dupuys, the mills of Noyras, remained closed during these years, following a number of setbacks. The Dupuys clearly seized some of their markets. All data used

TABLE 4
ANNUAL SALES OF THE DUPUY MILLS BY ORIGIN OF PAPER, 1739–1779

Year	Dupuy Paper (livres tournois)	Subcontracted Paper (livres tournois)
1739	18,317	20,759
1740	29,369	18,909
1741	26,044	15,027
1742	13,409	8,325
1743	34,133	1,658
1744	33,806	10,733
1745	38,575	3,867
1746	40,603	6,366
1747	62,645	9,051
1748	45,870	16,517
1749	57,507	19,778
1750	73,029	21,592
1751	64,102	28,035
1752	61,724	27,063
1753	72,150	42,947
1754	56,237	14,167
1755	85,601	61,548
1756	83,823	32,240
1757	76,482	17,121
1758	53,492	17,283
1759	63,789	5,702
1760	45,089	9,799
1761	50,129	9,064
1762	65,076	7,648
1763	75,854	7,533
1764	68,498	22,188
1765	76,096	1,848
1766	65,498	6,262
1767	67,105	9,066
1768	65,460	8,822
1769	78,462	6,252
1770	78,429	7,688
1771	54,386	7
1772	64,412	
1773	70,806	
1774	73,141	
1775	73,005	
1776	67,324	
1777	77,782	
1778	72,092	
1779	70,294	

Source: See the text.

were among the principal lenders previously observed.

Although no further direct evidence of similar subcontracting networks has reached us, the roles played by a few prominent families in a variety of occasions attest to the centrality of their position in the life of all paper-

here come from the Dupuy account books. For the 1779 sales, see AD 63, *notaire* Journet, May 19 and 21–25 and August 10–12, 1779.

makers. They systematically represented their industry vis à vis the administration, frequently acted as mediators among their neighbors, and assisted them in the collecting of distant accounts. Naturally, they also obliged them by witnessing the marriage of their children, a classic testimony to their role in the valleys.[32]

THE REWARDS AND LIABILITIES OF SUBCONTRACTING

Subcontracting practices have been observed elsewhere. Familiar to construction sites in Paris, they have also been associated with the vitality of certain metal trades, and it has been suggested that they characterized much of France's eighteenth-century urban crafts where they compensated for the apparent small size of shops. Sidney Pollard has insisted on the logic and the longevity of this practice in England, and Philip Scranton has located subcontracting among the principal mechanisms through which the textile manufacturers of Philadelphia answered surges in demand.[33] Recently, reflections on subcontracting have developed in parallel to studies of "the nature of the firm." Economic historians have conceptualized the alternative offered by subcontracting, suggesting that, between the extremes of the administratively structured large capitalist firms and the market-based procurement relations of independent enterprises of a limited size, subcontracting appears determined essentially by the costs of transactions in a given context.[34] The case at hand offers a chance to explore the context in which subcontracting occurred in the early modern period and some of its implications.

Subcontracting divided the risks associated with production. It could, for instance, lessen the impact of work stoppages due to labor conflicts or drought. This may not always have been the case in Ambert, where the settings of the mills involved were not significantly distinct and adverse conditions may have often affected a large number of mills. Nonetheless, excluding such large-scale disruptions, subcontracting introduced a fixed element in the cost calculations of the contractor. For the subcontractor, the fixed-price clause offered an incentive to strive for efficiency by excluding all possibilities of recouping an eventual slippage in the cost of production.[35]

Subcontracting minimized the fixed-capital requirements of the principal enterprises by using the mills and equipment of the subcontractors. In effect,

[32]AD 63, B AM 61, August 12, 1724; *notaire* Maignet, March 3, 1775, February 12, 1776, July 15, 1777, April 26, 1786; 5 E 12 dep.451, August 23, 1691; and so forth.

[33]Moulin, *Les maçons*, pp. 149–52; Berg, "Small Producer Capitalism," pp. 21–26; Sabel and Zeitlin, "Historical Alternatives," pp. 142 and following; Sonenscher, *Work*, pp. 29–33, 132–33, 139–48, 192; Pollard, *Genesis*, pp. 38–47; Taylor, "Sub-Contracting System"; and Scranton, *Proprietary Capitalism*, p. 55.

[34]For an introduction to these reflections, see for instance Williamson and Winter, *Nature*; among recent contributions, see Eccles, "Quasifirm"; and Enright, "Organization."

[35]Crucial to the apportioning of risks were the clauses defining the provision of rags, the cost of which was a large risk factor in this business. The arrangements varied with regard to this point.

it allowed mill owners to respond to high levels of demand without having to maintain a proportionally high capacity of production. The well-developed infrastructure of these valleys offered a valuable alternative to individual expansion, a flexible answer to the vagaries of the market.[36] In turn, subcontracting offered the more modest mill owners a chance to avoid or limit downtimes, a matter of importance not only because of the need for revenues but also because the wooden structure of idle mills deteriorated rapidly.

Subcontracting added flexibility to the management of enterprises. It spared mill owners the disruptions inherent in the trial of new practices or the installation of a new machine. It also avoided the disciplining of an unusually large work force that accompanied the building of large mills or the coordination of several existing units. These last factors will appear significant when seen in light of the difficulties encountered by the Montgolfiers of Annonay when they radically redesigned their operations.[37]

Because all parties remained the producers of finished reams of paper, the gains to be reaped from a further division of labor were limited. Still, the principal contractor was freed, in part, from supervisory tasks, and able to devote more time to the running of the main mill and important marketing priorities. The subcontractor, on the other hand, was relieved of marketing concerns. This must have been an important point since this region served all of France (and beyond) through Paris, a context which supposed the maintenance of costly contacts.[38] Further productivity gains may have resulted from the fact that both parties were allowed to focus on the production of a relatively long run of one type of paper.[39] Close to the task and working in a familiar mill with their own contacts and personnel, subcontractors could no doubt become very proficient. In turn, their expertise would have been well-known locally.

The limited duration of contracts and the relatively large number of possible combinations helped minimize the risks of a drift toward any monopoly position. The close proximity of these mills facilitated the indispensable flow of information among all parties. In particular, risks of misapprop-

[36]However, no instance is found of (presumably short) "rush" contracts responding to particularly pressing demand and allowing for exceptional profits, as encountered in Philadelphia (Scranton, *Proprietary Capitalism*, p. 56).

[37]Reynaud, *Les moulins*, pp. 161–82.

[38]The marketing circuits of paper are poorly known. Apparent is the central, redistributing role of Paris, which imposed either direct contacts with important consumers or the leaving of paper on consignment with Paris merchants, an alternative that immobilized substantial portions of output. Few Ambert producers could have satisfied themselves with the local market (Creveaux, *Evolution*; and Reynaud, *Les moulins*, pp. 192–99).

[39]The making of different types of paper demanded the use of different moulds and various blends of rags, as well perhaps as minute adjustments to the *tour de main* that may have required a certain time. On the other hand, the making of various grades of paper allowed the use of all the rags purchased (no evidence exists of the possibility of buying sorted rags).

riation of materials must have remained limited by the narrow confines of this densely populated world. Since the subcontractor remained responsible for a complete cycle of production from rags to paper, no particular transportation issues were raised.

Some of the concerns associated with subcontracting may have found an echo in Ambert. The practice, focused on short-term contracts and limited-scale operations, may have inhibited long-term planning and the development of managerial skills. Notably, if it proved to be an alternative to the acquisition of new techniques, subcontracting would fail to prepare papermakers for the demands that the adoption of the truly innovative methods developed in the following century would place on them and their workforce. Once again, the thorough accounts of the difficulties encountered by the Montgolfiers during their modernization drive are convincing in this regard: innovation does not come easily, and the value of such painful experiences must not be underestimated.

Subcontracting could also prove detrimental to the quality of production. In spite of the precautions taken in the writing of contracts, such as the use of sample sheets of paper, the principal contractor could find it difficult to reject a completed batch of paper when it was needed. At the very least, subcontracting did not favor incremental improvements in the quality of the product, often achieved through careful attention to all steps of the production process. Indeed, the record offers some evidence that, by the end of the eighteenth century, the high reputation of Ambert paper had diminished.[40] Also noted has been the fact that the production target of subcontractors, tightly constrained by a fixed-price agreement, might have been reached through over-exploitation of the workforce, a condition that could have a deleterious effect on the productive capabilities of the region in the long run. Finally, subcontracting could not replace the need for further fixed investment after a long period of sustained growth in output. Yet, it transferred part of the responsibility for new investment toward small producers, who may not have been in a position to marshall the necessary resources. The plateau observable in the (admittedly less than adequate) available production figures during the last two decades of the eighteenth century may in part have been related to the limits of the productive capacity of the Three Valleys.

Nevertheless, by the end of the period considered here, the impact of the subcontracting decisions taken by Ambert papermakers was positive. If, until the late 1760s, the growth of production can be seen as a recovery from

[40]In the accounts of the Revolutionary or early nineteenth century periods, the lack of attention paid to the production of the Auvergne is significant to this effect (see Creveaux, "*L'industrie*"; and André, *La papeterie*, chap.1). A few years before, the discussions around the choice of a manufacture for the establishment of a "model" paper mill also ignored Ambert (Creveaux, *La première école*).

the previous recession, after that date Ambert produced more paper than ever. Subcontracting undoubtedly intensified the activity of its mills.

WHY WAS SUBCONTRACTING A PREFERRED CHOICE IN AMBERT?

If it is relatively easy to reflect on the potential benefits and liabilities of subcontracting, it remains more difficult to demonstrate why Ambert papermakers preferred this route toward expanded sales to the initiatives pursued by many of their competitors. The previous section has shown that subcontracting promised to spare papermakers many of the hassles and risks inherent in innovation and expansion of the scale of production. Yet the appeal of modernization was successful enough across the kingdom that we must find more substantial reasons to explain the aloofness of Ambert manufacturers toward this trend.

The wording of the *traités* recording the practice is less than revealing. The general tone is one of caution and regrets to have to embark on this course of action, but a traditional reluctance in the face of a formal, binding written contract involving a loan of several thousand *livres tournois* would be sufficient to explain such hesitations. After all, the *méfiance* of Auvergnat dealers is still proverbial. These texts also suggest that the smaller producers approached the lenders, but we should not read in this formulation more than the expected expression of the respect that a modest papermaker should have displayed toward the man or woman lending him or her a large and critical sum of money.

A convergence of interests no doubt brought the parties together, but it cannot be quantified. A decisive comparison of the cost benefits of subcontracting with those expected from innovation or expansion of plants is impossible for lack of appropriate data.[41] Furthermore, no evidence suggests that papermakers conducted, even in a summary fashion, such computations. However, we know that options other than subcontracting were successfully pursued in other regions, in circumstances that were not fundamentally distinct from those in Ambert. This contrast can shed light on the factors that favored subcontracting to the exclusion of alternatives in these three valleys. In fact, such an analysis may start with a number of less than satisfying answers. We have already suggested, for instance, that several Ambert families had the means to invest in the innovations of the period. It clearly cannot be said that the Gourbeyres, Dupuys, Richards, or Vimals of these valleys turned to subcontracting because they could not afford to consider

[41] Small enterprises have rarely, if ever, left data relative to their profitability, and the eighteenth century does not offer aggregate data allowing for an interregional comparison. In the case of the hollanders, the most significant improvement to production, some solid documentation is available with regard to installation costs (in Annonay, for instance), but their contribution to the lowering of the costs of production can only be very poorly documented (see for instance the estimates given by de La Lande, *Art*), and never in the same context.

more costly, more ambitious plans. Nor were they fleeing the industry, as suggested earlier in this article.

The relative isolation of the Auvergne may be considered a second distinguishing factor between Ambert and its rivals. However, it must be remembered that the location of Ambert was only marginally worse than that of Annonay or the mills of the Vosges, and that a complex web of fiscal exemptions compensated somewhat for the distance until the fall of the monarchy. It is only in the nineteenth century that substantial improvements to roads and waterways would give certain regions a decisive advantage over the Auvergne.[42] Furthermore, the bulk of transportation costs, incurred in the supplying of rags and the shipping of paper, would not have been substantially changed by the choice of a large plant or the use of hollanders over that of subcontracting. Nonetheless, one must acknowledge that the isolation of this industry in an overwhelmingly agrarian region could not, in the end, foster a climate conducive to the adoption of innovative manufacturing techniques.

No decisive argument for subcontracting can be found in the little we know of the demand for paper. Clearly, the diversity of the types of paper leaving mills in the eighteenth century as well as their relative standardization within traditional categories were suited to the practice of (relatively modest) "batch production," now considered central to "flexible specialization." Yet there is no evidence that the mills of Ambert carved out for themselves a market distinct from that served by the new large and innovative mills of some of their competitors. On the contrary, it appears that the reputation for quality, the very distinctiveness of Ambert papers sagged toward the end of the period of interest to us.[43]

Finally, in view of the militancy of paper workers throughout the country, some may be tempted to argue that Ambert papermakers shied away from modernizing their mills for fear of labor hostility. Two objections may be raised against such reasoning. First, it should be noted that other producers, the Montgolfiers in particular, saw in labor tensions a crucial reason to push ahead with innovations. Second is the fact that, during the second half of the century, at a time when labor conflicts multiplied in French paper mills, and notably in Thiers, Ambert appears relatively quiet. This comparison suggests that it is unlikely that labor unrest checked mill owners' renovating ambitions, although it could always be advanced that the lack of innovation contributed to this tranquillity.[44]

[42]French transportation issues have been recently addressed in *Histoire, économie et société*. For an early statement of the monarchy's attention to "regional disparities," see a letter from Colbert (November 21, 1670, pp. 582–83, in Clément, *Lettres*).

[43]A comparison of output and markets is possible between those of the Dupuys (sales records cited in note 4) and Montgolfiers (see note 38); with respect to the quality of paper, see note 40.

[44]The administrative series of the archives of any papermaking region will yield mentions of labor

Several compelling explanations of the decisions made in Ambert can, nonetheless, be teased out of the existing record. They bring together a particular economic climate, a community's understanding of the resilience of medium-sized plants, and the social hierarchy familiar to these valleys.

The chronology of the subcontracting treaties only partly justifies the excuses borrowers advanced, centered around exceptional hardships. However, it directs our attention to an economic climate marked by diminishing returns. Five contracts were signed in the 1750s, a difficult decade, and only two during the following dynamic ten years. More notable, however, is the increase that followed: eight were signed from 1770 to 1779, and nine during the last decade of the Old Regime. Rather than seeing such contracts as linked to the crises of the paper industry, one should take into account both the increasing demand for paper and the tightening of the profitability of paper mills. It was because the cost of raw materials was climbing more rapidly than that of paper itself that small mill owners had to borrow to produce, a need intensified by the very slow pace of returns of this industry.[45] But it was also because a growing market offered prospects for larger volumes of sales that the wealthiest papermakers agreed to finance the activity of their smaller neighbors and asked to be repaid in paper. Sagging profitability at a time of growing demand brought together those needing capital to produce and those needing paper to sell.[46]

Subcontracting was also favored by an attachment to the size of plants that had served this community well over several centuries. The medium-sized mill, which typically employed 10 to 20 people, had a good and justified reputation. A study of the evolution of the size of firms (according to the number of waterwheels) through the eighteenth century shows that such units fared best through difficult periods.[47] The prudence manifest in the

unrest, while Gachet provides a succinct survey of the eighteenth-century context ("Les grèves"). For the Annonay context see note 37. A 1783 statement by mill owners denouncing the unruly behavior of Ambert *compagnons* is found in AD 1 C 537.

[45]This contrast is documented in sources mentioned in note 7. In broad terms, one hundred pounds of a mix of paper that sold, on average, almost 40 lt at midcentury reached 50 lt in the early 1780s. The price of rags almost doubled during the same period. The slow pace of papermaking (and in particular the delays attendant to the fermentation of the rags and the several rounds of drying of the sheets) added to the slow rate of payment characteristic of most early modern commerce (see to that effect the comments made by Pierre Gourbeyre, ci. 1770, AD 63, 4 J 521).

[46]We simply do not know if previous periods of expansion were accompanied by a tightening of the profitability of papermaking (something clearly linked to the availability of rags in relation to the demand for paper), much less if similar circumstances triggered a similar (subcontracting) response.

[47]When the paper market soured and the production of Ambert plunged just before 1740, the mills the most affected were the larger ones, powered by at least three wheels. Their share of the number of wheels active in the three valleys shrunk from more than 60 percent to less than 30 percent. It would be almost two decades before they recovered their former positions. The smallest mills (one waterwheel), were also shaken by the downturn. Such fluctuations left medium-sized mills, powered by two wheels, as the least affected by difficult times, their ranks actually swollen by the retreat of larger neighbors (see Table 2).

attachment to enterprises of modest sizes was justified by the fact that, in spite of its dynamism, papermaking remained arduous and perilous like all manufacturing ventures during the early modern era. During the last two reigns of the Old Regime, at least three-quarters of the mills of Ambert experienced some major failing, and these setbacks occurred as frequently during the dynamic post-1760 period as during the troubled previous two decades.[48] Without pretending that such conditions were particular to Ambert, it seems possible to suggest that in more dynamic and more diversified regions, examples of successful expansions in this and other manufacturing fields may have lightened this traditional attachment to the proven solidity of a modest operation. It remained strong in these mountains.

The real distinctiveness of Ambert, in the end, is to be sought in its historical, geographical, and social characteristics. Here had grown, some three centuries earlier, the most successful center for the production of paper. The extraordinarily high density of mills in this center, as well as its exceptional size, certainly favored subcontracting.[49] Other French papermaking centers were smaller by far (Thiers, Annonay, Essonnes), and more dispersed (Angoumois, Normandy, Périgord, Vosges). It is clear that the Montgolfiers of Annonay or the Delagarde brothers of Essonnes could not have found the same number of smaller papermakers needing and willing to answer their demands at the doors of their mills.

Not only were the transaction costs characteristic of subcontracting lowered by the density of mills in Ambert, but the proportion of potential subcontractors may have been higher in Ambert than elsewhere. This center was characterized by an unusually high proportion of independently owned and operated mills, a ratio that must naturally be related to the relatively minor role of merchant capital noted above. Instances of units operated by tenants were not rare, but certainly less prominent than in other important French papermaking centers. In the Angoumois, the Vosges, Burgundy, or in neighboring Thiers, a large proportion of mills were owned by urban merchants and leased to papermakers.[50] This high level of independent ownership suggests that a relatively large number of less financially solid papermakers may have been tempted to see in subcontracting a solution to what they saw as temporary difficulties.

[48]By these words is meant a recognized bankruptcy or the forced scheduled repayment of large debts, the entrusting of the mills to a new management or the sale of important assets.

[49]In the valley where two-thirds of Ambert producers clustered, 35 wheels (belonging to 15 papermakers) shared 190 m of vertical drop on a 3 km stretch of one stream, and 20 wheels (7 producers on 2 kms) shared 120 m of vertical drop on its affluent (Boithias and Mondin, *Les moulins*, pp. 73–80).

[50]See the references given in notes 25 and 26, plus Janot, *Les moulins*, p. 114; and Rouleau, "Les anciens moulins," p. 175. Interestingly, these studies suggest that the ratio of independently owned and operated mills rose late in the eighteenth century in these areas. Conversely, others have noted a low level of tenancies in minor paper-producing centers such as the Périgord, Franche-Comté, and so forth.

At the same time, it is crucial to note that the overall size of the Ambert papermaking community helped diffuse the feelings of dependency that such links might have fostered. This center offered enough choices that no one necessarily felt trapped in their position. As mentioned, the networks sketched here were not exclusive. The dense links woven by largely endogamous marriage patterns no doubt facilitated the contacts necessary for subcontracting, but they do not appear to have done so in a divisive or limiting manner: no visible clan stands out in this world. Although for the duration of the contract at least, the status of subcontractors as entrepreneurs became somewhat of an illusion, they likely retained the hope of recovering their independence and felt that they remained *fabricants de papier*.

The importance of established social relations and the multitude of links existing between nominally autonomous producers must not be underestimated. The tradition of independence that is today associated with the world of the small or medium-sized producers cannot be simply translated to the preindustrial era. François Gresle, who issued this warning, suggested that the early modern world of work be seen as a world of "interdependence" in a *"société d'interconnaissance."*[51] Dense and long-lasting networks of social relations among producers are in fact much in evidence in several instances of "alternative" organizations of production in preindustrial and industrializing Europe and again in recent studies of contemporary "industrial districts."[52] The case at hand reminds us, however, that widespread subcontracting within a precisely defined sectorial and geographical context does not automatically imply a nonhierarchical organization of production.

On the contrary, it appears possible to suggest that in Ambert, a well-established social hierarchy favored subcontracting initiatives. Tax rolls leave no doubt as to the persistence, through the period considered here, of a significant contrast between a relatively homogeneous majority of small or medium producers and a narrow elite of a few prominent families (Table 5). This substantial and stable distinction between a few leading producers and their more modest neighbors could only make subcontracting networks centered on the former appear less than surprising and rather "natural" in fact. Cooperation does not signal nor require any tendency toward equality among producers. In Ambert, it rested on the acceptance of a well-established hierarchy.

A final observation may indirectly support the thesis advanced here regarding the importance of social structures—and in particular a pronounced hierarchy—in the choice between subcontracting and innovation. The unique and short-lived attempt at installing hollanders in Ambert (the

[51]Gresle, *Indépendants*, vol.2, pp. 935–40.

[52]See for instance Duplessis and Howell ("Reconsidering"); Sabel and Zeitlin ("Historical Alternatives); Enright ("Organization"); and Storper and Scott, *Pathways*.

TABLE 5
DISTRIBUTION OF TAX BURDEN ON PAPERMAKERS, 1737, 1763, 1778
(livres tournois)

Papermaker Number	1737	1763	1778
1	6.4	6.5	5.0
2	12.1	7.9	9.0
3	13.0	9.9	10.3
4	13.0	10.0	12.5
5	13.0	10.4	13.5
6	14.4	13.5	16.2
7	14.9	14.3	17.7
8	14.9	16.3	18.1
9	15.0	16.9	18.1
10	19.1	17.2	18.2
11	19.5	18.0	18.3
12	20.9	18.2	18.8
13	23.0	18.4	22.0
14	23.3	18.4	24.1
15	27.3	21.0	28.9
16	28.0	21.1	29.4
17	28.4	22.5	29.5
18	30.0	32.7	31.9
19	31.0	36.0	34.4
20	36.1	36.9	34.9
21	37.0	38.6	40.0
22	39.0	44.7	41.8
23	44.6	51.2	52.0
24	44.6	51.6	55.0
25	44.8	57.9	55.5
26	48.5	61.4	56.5
27	56.4	68.1	65.3
28	61.2	68.3	67.1
29	61.3	76.5	68.3
30	68.7	83.4	68.7
31	72.2	107.9	107.5
32	74.0	120.0	147.0
33	84.5	120.0	187.5
34	141.0	125.0	250.0
35	179.8	143.2	
36	222.8		
37	316.0		

Source: See the text.

mill burned down upon completion of the task) was the work of a dynamic family, the Tamisiers, a family "newly" established in the trade by local standards. Damien Tamisier was a paper worker when he bought the derelict mills of Boys in 1740 for the relatively modest sum of 9,200 lt, of which 7,000 lt were borrowed. This installation was successful; over the following decades the mill was rebuilt and expanded to four waterwheels and several pieces of land were purchased. In 1776 the local *Inspecteur des manufactures* praised the rapid rise of the Tamisiers and the quality of their paper. In spite of such accolades this family remained modest when compared to

the leading names of the Three Valleys. We know, for instance, that Damien Tamisier married his daughter Anne to Guillaume Chesles and then Claude Filliat, both *compagnons* who had risen to the level of owner-manufacturer at the neighboring Boule-Haute mill. His son Jean, who was to inherit the main mill, married the daughter of a minor, recently failed line of papermakers, the Francolon of Longuechaud. Furthermore, their growing tax burden reached only one third of that paid by their immediate neighbors the Richards and Vimals by the 1780s.[53] Forty relatively prosperous years had not, in all likelihood, brought them to a position that allowed them to gather around their mill the kind of network of subcontractors we detect around more established families. For them, the construction of hollanders proved more tempting, although the 1785 fire that ravaged Boys checked their ambitions.[54] We do not know enough about this family and its decisions to propose it as a full-fledged counter-example to the more prevalent pattern encountered in Ambert. Nonetheless, it is clear that to the Tamisiers, a dynamic and ambitious family of still modest social standing, the choice between subcontracting and innovation presented itself in a different light than it did to more respected papermakers. Similarly, the interest in hollanders shown by small producers located in the peripheral areas of the Auvergne (and elsewhere in France) may also be linked to their relative isolation.

CONCLUSION

The second half of the eighteenth century witnessed the first signs of the renovation of the French papermaking industry long before the introduction of the paper machine. It consequently offers several lessons relevant to our understanding of the choices facing entrepreneurs at the close of the early modern period, a time of increased production without mechanization. This industry had always been characterized by a concentration of production in mills, some of which had reached substantial proportions as early as the seventeenth century. The improvements to papermaking that spread in the eighteenth century did not fundamentally alter the nature of the trade, yet they found their place in the plans of ambitious manufacturers. The period saw the creation of very large mills that fully deserve the appellation of non-mechanized factories, not only for their size but also for the attention they paid to innovations and a rational organization of production.

[53]AD 63, 1 C 532 (1776); *notaire* Ponchon, March 8, 1740, February 22, 1760, June 6, 1751). See the tax rolls of the parish of La Forie, AD 63 B IS. The family appears only once among principal lenders.

[54]The hollanders they claimed to have installed just before the accident must have been modest versions of the system, since the Tamisier only estimated their losses at 25,000 lt. It is interesting to note that no suggestion arose of arson motivated by jealousy or anger at innovation. The fire was blamed on the drinking of two workers (Tamisier-Vaissier suit, July 28, 1787, AD 63 1 J 757).

However, the papermakers of Ambert, who had long stood at the apex of their industry, followed another path. They chose not to expand their mills or enterprises, just as they disregarded most of the innovations slowly transforming their old craft. This article has brought to light the alternative they preferred: subcontracting. Their decisions proved well founded, inasmuch as subcontracting maximized the output of this leading region. One finds here confirmation of the diversity of options awaiting manufacturers to which recent historiographical trends have drawn our attention. The context in which these decisions were reached, however, takes us beyond this first conclusion.

Nothing in the setting of their mills, the markets they served, or their financial capabilities would have prevented the leading manufacturers of Ambert to follow at least some of the trends pursued by many of their competitors. Because of the prominent positions held by this center in general and by a few of its papermakers in particular, but also because of the efforts made by the government to disseminate information on new practices, we must assume that many of them carefully considered each potential improvement to the running of a mill. We cannot precisely know what possible perils outweighed expected benefits in their minds, but we can see that subcontracting appeared to them as a better choice. And we can outline the circumstances that made it an attractive option.

Although the impact of the relative isolation of the Auvergne should not be exaggerated, at least until the following century, it likely heightened the prudence of papermakers and their attachment to the traditional size of their mills. After all, the mid-eighteenth-century depression had again demonstrated that two-wheel operations fared best under adversity. The overwhelming presence of this industry in these isolated valleys also lessened papermakers' exposure to change and sharpened their awareness of the resources of their eminently successful community. To them, subcontracting offered a way to serve expanding markets while relying on an existing infrastructure of essentially medium-sized enterprises and time-honored practices.

Most importantly, the transactions required by subcontracting found a propitious environment in Ambert. This center gathered more mills in a tighter concentration than any other. The great majority of mills were independently owned and operated by families with a long and proven record. An established hierarchy gave preeminence to a handful of dynasties that played a central role in these parishes, and extensive family ties added to the cohesion of this group. The client-patron relations forged by subcontracting acknowledged inequalities while preserving for all the pride associated with the title of *fabricants de papier* in the most prestigious center of its kind.

The economic circumstances of the last decades of the Old Regime did the rest. A strong demand sustained rising prices of paper and offered bright

prospects, but a much sharper rise in the cost of rags strained the resources of many small producers, those less able to await the slow returns characteristic of this trade. In Ambert, these conditions and a particular social structure brought together papermakers who, for different yet related reasons, found it in their interest to seek to benefit from an expanding market with the least disruption to the structures that had served them so well for so long. The very socioeconomic fabric Ambert papermakers wished to protect eased the subcontracting practices that distinguished this manufacturing center from its competitors. Economic growth was not, indeed, a narrow linear path, but the social structure of each community of producers opened certain doors wider than others.

What is remarkable about the situation examined here is the quasi-unanimity with which this leading center turned away from the modest innovations of the period. Clearly, subcontracting offered an attractive alternative to innovation and expansion at other times, in other contexts. It seems indeed well-suited to a society weary of change and valuing a stable social hierarchy and the "vertical allegiances" that sustain it. The papermaking community of Ambert may simply be a particularly legible instance of a less than rare situation in Old Regime France or Europe: a milieu where subcontracting offered output growth within existing physical and social structures. A tempting solution.

EPILOGUE

Eventually, after the spread of the paper machine which came back to France from England under the name of the Fourdrinier machine in the 1820s, papermaking, or at least papermaking on a notable scale, left the Three Valleys of Ambert. The revolutionary and imperial years brought too many crucial alterations to the economic landscape to allow for a quick evaluation of the contribution made by the choices analyzed here to the demise of this manufacturing center. A few come to mind easily, although not necessarily in any particular order of importance. The fall of the Old Regime imposed a new fiscal system, one less attuned to the needs of peripheral provinces. Personal attacks on some manufacturers who had, after all, belonged to the elites of the fallen order, as well as favors toward those most attuned to the rapid changes that followed, could not but shake the hierarchy of producers. Requisitions of paper and centralized distribution of increasingly rare raw materials (this is when reams of irreplaceable documents were "recycled") distorted the balance of risks and opportunities. Wars and blockades reoriented the production of major centers such as the Angoumois toward the domestic market. New economic, political and military priorities and investments accelerated and reshaped the communication

improvements initiated by the monarchy. How are we to fit in this partial account of the transformations of the period the concerns raised earlier about certain of the long-term consequences of subcontracting?

Recent studies have shown that subcontracting and other alternatives to mass production do not preclude the adoption of technological innovations and may, on the contrary, foster the development of appropriate ones.[55] Yet if it is true that in Ambert subcontracting displaced, for a time at least, the need for a renewal of papermaking methods, it would have deprived local manufacturers of a crucial period of apprenticeship of innovation. And the particularly uncertain circumstances of the revolutionary and imperial years that followed would no doubt have complicated the task of those eventually eager to innovate. Only a careful study of this manufacturing center over the two generations that followed the fall of the monarchy could disentangle the dependencies created by the managerial decisions of Old Regime Ambert papermakers from the heavy blows dealt to their successors by a myriad of external factors. This remains a topic for further research.

[55] See for instance the convincing examples exposed by Sabel and Zeitlin ("Historical Alternatives," pp. 144–47), or the illustration provided by Scranton, *Proprietary Capitalism*, pp. 332–33.

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