Looking at English and German Banking in the French Mirror: Relationship Banking and Development in France (1880-1913)[1]

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Abstract

Do banking structures matter for economic development? Even though Gerschenkron's arguments have been reappraised debates remain topical in microeconomics of banking. Consistent with this literature, we develop a simple model that accounts for the access to private information conditionally to bank size. Based on the ability to manage soft information, we show that small banks lend to risky projects while large banks work with safe clients. We match the model with the French experience of the classical period (1880-1914) and give evidence that theory fits the facts. Regard to the importance of small and medium enterprises (SMEs) in France at that time, we hypothesize that small (local) banks helped to economic development. The paper then looks for correlations between local banking market share and innovation and growth. Results underpin the main hypotheses. Finally, regard to the relative importance of banks' local knowledge in Germany, this contribution sheds some lights on the Gerschenkronian debate. As far as SMEs turned out to be significantly part of the economic development in England and Germany, we argue that German banking advantage, if any, might stem from private information management ability rather than orthodox stance on universal banking features.

I. Introduction

Since Gerschenkron, German and English banks have often been compared and used as stereotypes of the "efficient" and "inefficient" banking system of the classical period (1880-1914). It has been said that German universal banks helped coordinate industrial business while English specialized banks focused too much on short term and "speculative" activities. However, new contributions in economic history have pointed out the overconfidence vis-à-vis German universal banks. For instance, Fohlin (1998 & 1999) rejected board representation advantages and cast the doubt on so called banking coordination of the German industry. Also, Edwards & Ogilvie (1996) refuted the Gerschenkronian's stance on bank/industry nexus

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in the sense that it just concerned few large firms' investments. German large banks had a limited influence on industrial development in this regard. At the same time Capie & Collins (1999) and Baker & Collins (1999) elevated the English banking reputation. They showed in particular that commercial banks rolled over short term loans and supported industrial clients in period of distress. The evolution of debates is therefore smoothing the "German advantage" (see Collins 1998 for discussion).

Even though Gerschenkron's arguments have been reappraised, questions on banks and firms relationships remain topical. Additional arguments can then be found in microeconomics of banking models. As recently documented in theoretical papers the size of the bank *per se* (Cf. Stein 2002) and distance from headquarter (Alessendrini & al. 2007) expound banks competitiveness according to borrowers' type. Local banks manage private information and select promising small and medium enterprises (SMEs) whereas large network banks help to capital transfer from one region to others (see Berger & al. 2005 and Uchida & al. 2008 amongst others for empirical studies). Therefore, as long as the economic development of a region hinges on SMEs business local banks may have a big role to play for that development.

In this respect, it is worth noting that English and German economic structure still depended on SMEs up to the WWI. According to Edward & Ogilvie's (1996) calculation, the net capital of industrial joint stock companies as a proportion of the total industrial capital stock is only equal to 17.8% in 1913 in Germany. Also, the (first) English census of 1924 shows that SMEs (<500 employees) in manufacturing still contributed for 65% of the net English output. Lastly, it is worth underlining that in their inquiry of the largest industrial companies, Kinghorn & Nye (1996) find that British industrial concentration at the beginning of the twentieth century was larger than in Germany[3].

Based on the "big five" hegemony, the English banking system seems to tie in with network banks type (Baker & Collins 2002). In fact, the number of branches per bank in England and Wales was already equal to 156 in 1913. On the other hand, German banks appeared more embedded in local business (Guinnane 2002, Carnevali 2005 and Fohlin 2007). By 1913, there were still 1221 private banks in Germany and 402 Commercial banks, a very small proportion of which had branches nationwide. In addition, according to Goldsmith (1969), the share of private, local, and regional banks contributed to 19.4% of German financial institutions assets in 1913, while the figure was only equal to 9% for large *kreditbanken*[4]. Given Stein (2002) hypotheses and the role of SMEs in England and Germany, German banking advantage, if any, might thus have come from private information

[3] It is worth noting that Kinghorn and Nye also find that French industrial concentration was no smaller than in Britain.

[4] *Kreditbanken* are joint stock banks.

management (see Guinnane 2002, Carnevali 2005, and Fohlin 2007 for disucussion)[5].

Nevertheless, the absence of comparison tools prevents us from comparing national banking systems. In this respect, the analysis of the French case might help us circumvent the issue. Indeed, the French banking system of the classical period (1880-1913) can be considered as an intermediate case amid English and German banking systems (see Collins 1998, Lescure 2003, and Carnevali 2005 amongst others). Also, because the French can be easily sorted out according to the size of their geographical network, microeconomics of banking principles can be used to assess banking actors. Therefore, we hope to shed some lights on previous debates, comparing French small (local) and large (deposit) banks.

In one side, local banks rely on local statement and private information management so as to get relationship's facilities. As documented by French historians (Cf. Bouvier 1979, Capmal 1921 and Morsel 1972) such banks were able to select and lend to new and dynamic enterprises inside industrial districts. In this respect, they helped start innovative projects as documented by Chapernay (1939) and Morsel (1972) in the region of Lille, Lyon, Nancy, and Grenoble. In fact, new industries such as automobile, energy, and electrochemical often relied on local banks loans to start and expand their businesses (Cf. Lescure & Levy-Leboyer 1991). Also, based on inquiries on pre-war German banking system (see Guinnane 2002, and Fohlin 2007 amongst other) such local features appear similar to German private banks, local banks, and credit cooperatives[6] features. The comparison somehow holds for large *kreditbanken* as well, as far as German large banks turned out to be linked with local business due to equity participation in local and private banks. Such strategy allowed large banks to get local statement and knowledge without paying for the centralization of information.

On the other side, French deposit (network) banks (Crédit Lyonnais, Société Générale, and Comptoir d'Escompte de Paris) mobilized savings and took advantage of economies of scale to provide safe and short term loans (Plessis 1991). In this respect, French deposit banks are often compared to English commercial banks because of high prudence, specialization (although to a lesser extent) in arm's length transaction, space reallocation of capital, and business scale (Lescure 2010)[7]. Nevertheless, some

[5] We do not argue that German banking is a homogeneous structure constituted with only one type of banks. We merely say that local banking features are more salient in Germany than in England.

[6] We do not speak about German saving banks (*sparkassen*) since they seemed to be mainly engaged on mortgages business. In addition, German *sparkassen* could not employ savings deposits for commercial advances until 1909.

[7] Some authors pointed out similarities with largest German banks as well. Quoting Carnevali: "commercial banks were conservative in their lending practices, preferring to concentrate on corporate finance, government lending, and wealthy individuals".

distinctions remain. In particular, English commercial banks often merged with provincial banks so as to constitute their network what somewhat prevented them from losing all provincial banks local knowledge. By contrast, French deposit banks preferred to set up new branches. This strategy impeded the acquisition of local knowledge and compelled deposit banks to rely on liquid commercial papers (Lescure 2010). Therefore, French deposit banks may have been even more affected than English joint stock banks as to the ability to use private knowledge.

Thereby, our inquiry searches for conditional effectiveness of local and deposit banks and encompasses a couple of new outcomes. First, we develop a model that expounds banks' size consequences on banking business. The intuition is the following: in a world of imperfect information, private knowledge management helps small banks use market power. The (conditional) extracted rent protects banks from potential losses and allows them to lend to riskier clients. On the other hand, large network banks cannot achieve private information without facing large transaction costs. However, because of increasing returns to scale large banks succeed to grab the safest part of the market. Small banks then get the remaining risky business. Therefore, the model helps explain the repartition of the banking business according to borrowers' level risk[8].

Second, empirical tests are used to underpin theoretical outcomes. In this respect, we built an indicator that account for local and deposit banks market share. Then, we checked for correlations between such ratio, GDP per capita growth, and an indicator of innovation. As far as systematic data about individual patents are lacking we used the tax on patents to assess innovation. Such tool has then the advantage to account for patents expected value, what is of high interest in such inquiry (see Griliches 1990 for discussion). Finally, we find that innovation and GDP per capita growth are positively correlated with local banks market share in industrial areas. On the other hand, local banks market share has negative impact on rural development. This last point is then probably due to the lack of innovative projects at work in agricultural sectors.

Since local banks helped SMEs' business undertaking, results come up with a couple of interpretation according to the causality at work. First, as far as innovative firms need capital to grow up local banks knowledge allows firms to get funds for their investments. This may then help capital accumulation and increase firms' productivity. Second, local banks' knowledge makes credit available to good enterprises and brings about firms' selection. The process keeps promising and innovating firms alive what increases productivity and growth.

[8] It contrasts with Anand & Galetovic (2006) who expound banking markets fragmentation through credit's volume and returns to scale differences. On the other hand, our results fit Boot & Thakor (2000) intuitions, except that we differentiate banks according to size feature rather than specialization level.

Section 2 reminds microeconomics of banking literature in small business lending. Section 3 deals with the French banking structure and gives evidence of local banks ability to lend to local and risky borrowers. Section 4 develops a theoretical model that accounts for small and large banks business distribution in a non-cooperative game. Section 5 presents the empirical strategy, the data, and interprets the results. Section 6 adds some discussions. Section 7 concludes.

II. Banks' size, credit constraints, innovation, and local development: a review of literature

The question we are speaking about can be separated in two fields of research. The first one deals with credit constraints as a result of banks' structure. The second one hinges on relationships between banks and innovation. Both are of high importance as they shape the framework of this study.

Stein (2002) proposes a model of banking that account for information management according to the bank size. Because of transfer costs the information (qualitative versus quantitative) used to allocate the assets among branches of the bank matter. In this respect, the larger is the bank, the more numerous the intermediaries, the higher the need for objective information. Large banks are then encouraged to use more quantitative information in this regard. In addition, the frequency of loan officer's turnover hampers the incentive to collect and transfer "soft" information (Scott 2004). By contrast, small banks' headquarter collects information and takes decisions at the same time what prevents them from costly transfer of soft information. Consequently, small banks appear more suited to finance small and opaque firms. Meanwhile, large banks take advantage of increasing returns to scale to work with safe borrowers. Empirical analyses have given evidence of this theoretical stance as hierarchical (large) banks use more credit scoring and impersonal interactions to allocate funds (Cf. Berger & al. 2005 amongst others). Nevertheless, Uchida & al. (2008) have shown that large banks may also produce private knowledge even though they concentrate their resources on transaction lending.

Additionally, a new set of literature is emerging as to the impact of geographical and cultural distance on information transfers. Distance from banks' headquarters matters insofar as information quality dwindles with it. As a matter of fact, even though effects melt down with communication's improvements, physical distance in United States reduces banks' ability to lend to small and opaque firms (Petersen & Rajan 2002). For Berger & DeYoung (2006) the cost and profit efficiency of multi-branch banks wanes with physical distance from the parent bank. Alessandrini et al. (2006) find that small firms suffer from both cultural and physical distance on a sliding

scale with the share of banks headquartered in distant provinces. Shortfalls in communication channels within national banks entail then incentive issues and agency costs. In this respect, local branches are not encouraged to collect private information what prevent banks from using relationship lending.

By the same token, new works have given evidence of distance constraints on innovation due to information issues. Because banks searches for limiting the risk related to loans, innovation comes up with some points of concern. First, innovation is characterized by proprietary information on future profitability. Second, innovations are intangible assets which are hardly pledged as collateral to secure loans. Third, new technology entails firms' restructuration and uncertainty *per se*. Fourth, firms are reluctant to diffuse information about innovative projects. Fifth, due to specific knowledge the quality of the innovation is barely identifiable by the bank. In this respect, because they have privileged relationships with firms, local banks must be better to manage loans related to firms' innovative projects. In fact, according to Alessandrini & al. (2008), the distance of local branches from the decisional centers is a major factor influencing the ability to collect and use private information related to firms' innovative projects. Also, Ferri & Rotondi (2006) shows that banking business concentration, captured with the Herfindahl-Hirschman Index (HHI), reduces the probability to introduce innovation. Therefore, local (small) banks appear good for firms' adoption of innovation.

Thereby, based on the pool of arguments, large network banks should not promote economic development in a decentralized economy made up of dynamic SMEs. Indeed, costly transfers of information prevent large banks from supporting local (and opaque) firms' projects. However, the current paradigm in small business lending might be reappraised for a couple of reasons. First, as argued by Berger & Udell (2006) relationship banking is not the only way to finance opaque firms. Some transaction lending technologies may be good substitute for costly relationships with firms. For instance, scoring techniques help figure out risk and may be part of the decision process of the bank. Besides, the menu of credit contracts helps banks adapt their loans to borrowers' needs[9]. Second, economies of scale related to hard information use and portfolios diversification increase large banks competitiveness. Lower costs may thus extend lending possibilities and provide risky firms with more hard information based credit. As inquired by Berger & Black (2011) it is not clear that small banks ease riskier business finance. In addition, as long as concentration may generate monopoly rents, network banks might provide riskier funds (Petersen & Rajan 1995) and ease SMEs access on credit. Yet, it is hard to say whether bank size matter for SMEs' innovation and development. This is why we

[9] Leasing is a good example of such contracts.

have designed a model that account for borrowers' intrinsic risk, relationship banking, and bank's market power in a world of information asymmetry.

However, given the aim of this paper, let's add some empirical (stylized) facts about French banks before proceeding to the model.

III. The French banking structure of the classical period

Local and deposit banks are the main banking actors of the French system of that time. Then, let's provide some facts on their activities.

Local banks had such a wide range of activities that it is hard to give a uniform presentation of them. They might have been single branch banks or multi-branch banks spread over quite a small area (the French literature talks about regional banks). Because there is no clear definition of banking in France before 1941, it is difficult to distinguish between banks and private "discounters" (*escompteurs privés*) although the latter appeared more specialized in discount transactions than the former. Also, banks may have often used more deposits than private discounter but the distinction remains weak. Nevertheless, defining banks as: "A firm that provides usual credits regardless of deposits' size"; Plessis (1999) succeeded to sort banks out. He then collected additional information on banks size thanks to the *rapport d'inspection des succursales de la Banque de France*.

Re-discounting local banks' bills, the *succursales* (Banque de France (BdF) branches) helped relax local liquidity constraints and worked with almost all banks in France. Though independent to the BdF headquarter the *succursales* were however inspected once a year. Thereby, inspections enumerate *succursales*' operations and help know more on local banks' size and business. Based on these reports Plessis calculated that the sum of local banks' capital was almost equal to 600 million of Franc (MF) in 1870. This number appears quite high compare to the 50MF of the Crédit Lyonnais' capital at the same date. Likewise, Plessis showed that local banks were very heterogeneous in terms of paid up capital (Table 1), what suggests a high gap between largest regional banks and small private discounters.

Table 1: Local and regional banks' capital in 1875

	from 40000 to 350000	from 350000 to 800000	from 800000 to 2000000	more than 2000000
Proportion of banks	40%	25%	15%	20%

Sources: Archive de la BdF (ABDF), *rapport d'inspection*, from Plessis (1999)

Also, despite clear definition of bank the *bottin du commerce et de l'industrie* can be used to account for the number of banks and branches

over several years and French *départements*. We thus have enumerated the number of banks and branches for all ten years from 1880 to 1910. Table 2 provides us with some valuable information in this regard. First, the level of branch concentration is very low in France (1.1 branches per bank in 1880 and 2.0 in 1910). As a comparison, there were already 4.5 "offices" per bank in England in 1868. Second, even though we do not account for deposit banks (DB: Crédit Lyonnais, Société Générale and, Comptoir National d'Escompte) in the calculation, concentration tends to increase insofar as some regional banks succeeded to get numerous branches. Nevertheless, even in 1910, the banking landscape is mainly composed of single branch banks though many local banks get more than two or three branches. As a matter of fact the Herfindhal Hirshamn Index (HHI) and the number of branch per banks remain very low at that time. Third, a huge gap remains in terms of branches between the largest local bank (Banque Privée with 30 branches) and the smallest deposit banks (Comptoir National d'Escompte with 139 branches) in 1910. Therefore, as underlined by Lescure (2010), although regional banks succeeded to some branches they still differ from large deposit banks by their ability to cope with transaction costs related to their size. Lastly, it is worth noting that, excluding deposit banks from the sample, the level of concentration in terms of branch is quite homogeneous across *départements* and remains very low in 1910. For instance, the HHI is 0.04 in the industrial *département* of Isère and 0.06 in the rural *département* of Ile-et-Vilaine[10]. Regional banks account thus for a small part of the banking landscape whatever local activities at play.

Notwithstanding local banks size heterogeneity, it is possible to pool some common features among local banks regardless of network and paid up capital size. Local banks often do business inside industrial districts and small business areas. Therefore, local and private knowledge help them cope with information issues what may ease lending operations to opaque clients. This is why local banks provide adapted facilities to local business. Either limited by specific areas or specific sector of activities, local banks' business is however barely diversified and subject to exogenous chocks. Even though some local banks get some branches, this point is a main source of concern due to the bankruptcy threat. Also, though close to the universal bank type, local banks in France do not play the same (so called) coordinating role as large universal banks in Germany (Lescure 2003). For instance, French local banks are rarely involved into firms' decision board[11] but they can take participations in some local companies[12]. Lastly, local banks provide long

[10] The higher figure of Ile-et-Vilaine stems from the lower number of branches in the *département*.

[11] Nevertheless some local and regional banks had cross participation with local firms. Conversely, local firms' representation into local banks boards were quite frequents.

[12] This was especially the case for small local banks. In other hand, regional banks were somewhat reluctant to take firms' participation due to liquidity issues.

term loans to SMEs' through massive rolled over overdrafts easily re-discountable to the BdF branches (see Nishimura 1995 and Lescure & Plessis 1999 for empirical evidence on local banks long term loans inside French industrial areas). This may be why figures of local and regional bank branches increase in some industrial areas (Meurthe-et-Moselle and Isère for example), where firms need long term loans for investments and working capitals.

Table 2: Banking concentration in France

	1910		1880	
number of branch	number of banks	share of banks	number of banks	share of banks
1	880	0,63	1691	0,91
2	113	0,08	90	0,048
3	33	0,023	12	0,006
4 to 5	24	0,017	3	0,002
6 to 70	10	0,006	2	0,001
10+	12	0,009	1	0,001
2+	192	0,37	108	0,09
HHI w. DB	0,0032		0,0005	
HHI	0,038		0,0033	
branches per bank w. DB	1,37		1,09	
branches per bank	2,05		1,12	

Source : *Bottin du commerce et de l'industrie* and the author calculation

Nonetheless, the share of local bank branches declines from 91% in 1880 to 66% in 1910. Two facts can explain this outcome. First, many new bank branches set up due to deposit banks' expansion. Second, some (fragile) local banks collapsed with the underlying competition on deposits, and discount's transactions. Failing banks were thus either in line with deposit banks business or unable to recycle their activities[13]. On the other hand, local knowledge and the BdF's local policy may have protected local banks from deposit banks' threat. This is why the number of local bank branches barely declines along the period (Table 4). In other words, local banks used private information advantage to lend to riskier borrowers which would have been put aside by deposit banks otherwise. In this respect, local banks worked extensively for new firms' investments and underwrote local enterprises' securities. For example, the few years before the WWI, the bank Chapernay in Grenoble helped for placing more than 50 enterprises' securities to local population (Plessis 1999). In addition, local banks helped industrial enterprises to cope with working capital needs

[13] Most of them were small banks constrained by the lack of available savings deposits generated by deposit banks competition (see Collot 1973 for an example on the Meuse experience).

through current account debit balances (that often tie in with credit papers and so-called "accommodation papers"). As a matter of fact, the *rapport d'inspection* of the Nancy's *succursale*[14] underlined by Nishimura (1995), says how local banks could sustain local industries: "[local banks] portfolio is composed of bills for participation [in business firms]. The illiquidity associated with such bills is limited by a very peculiar method of launching a business undertaking. The shares are never wholly paid up: the establishment is undertaken with funds lent by bankers and furnished by the [BdF] branch. As soon as the business as proved its worth sufficiently to be presented to the public, debentures are issued and borrowings are repaid. The banker participation is thus limited to a relatively short period." Obviously, credits papers jeopardized banks' liquidity conditions even if risks could be limited through BdF re-discount facilities. Therefore, industrial long term loans became a growing part of local banks' business from the end of the XIXth century up to the war. As an additional fact, the ratio of commercial bills on current account debit balances of 104 local and regional banks declines progressively from 1 in 1880 to 0.5 in 1910 (Table 3).

Meanwhile, the French banking system is subject to deposit banks geographical expansion. For, instance, the Société Générale set up more than 400 branches along twenty years. Though quite smaller, the number is about 230 branches for the Crédit Lyonnais. Deposit banks pursued this strategy as a way to diversify assets and avoid speculative activities that proved to be risky with the 1882 banking crisis. Because of the centralization of deposit banks business, savings deposits were indeed drained locally and used for Parisians speculative businesses (Lescure 2010). Nonetheless, geographical network triggers specific organization and sacrifice. Branches could not accept to lend to new firms without prior authorization from headquarter, so that private relationships barely interfere in the decision process. Local branches were not independent at all and had to conform to general instructions in almost every decision (Kauffman 1914). In other words, offices had to manage their portfolios given general precepts. Lastly, underwriting activities were selected in Paris, so that medium size industries had less opportunity to use deposit banks services in this regard. As a matter of facts, deposit banks mainly underwrote national bonds, railroads and large companies' securities in France and abroad (see Kaufmann 1914). Unlike local banks, the risk was all the more limited since deposit banks neither took participations nor kept companies' securities in the long run[15]. Deposit banks then merely helped for placing securities to their clients.

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[14] *Rapport d'inspection de la Banque de France*, *succursale de Nancy*, 1912.

[15] Let's add that apart from the Société Marseillaise de Crédit few regional banks took participations in companies (Lescure 2003), in other hand, some local banks could pursue this business in some circumstances (see Collot 1973 for an example on local banks investment banking activities).

Also, deposit banks preferred to use commercial papers for their lending operations (Table 3). Such feature contrasts with German and English banks, and comes up with the structure of French deposit banks network (Lescure 2010). Unlike large German and English banks, French deposit banks neither takeover nor had control on provincial (local) banks and preferred to expend their network by setting up new branches[16]. Likewise, prior to their nomination office's directors were often employed in distant places for different jobs. This prevented them from getting and using their experiences vis-a-vis local business and prevents local offices from using local and private information. In this respect, discount operations on commercial bills had some advantages. First it limited information asymmetries as the bank relied on the information the seller had on its client. Second, there was no need for controlling the loan since it had been made up on commercial purpose. In addition, as documented by Burkart & Ellingsen (2004) commercial papers are more difficult to divert than cash. Third, the discount of such bills is self-liquidating. Fourth, due to joint liability commitment banks could turn against the seller as the client failed. Unlike current account debit balances, such business helped curtail costs of monitoring and information collection.

Table 3: commercial portfolios on current account debit balances

	1880	1890	1900	1910
Deposit banks	0,7	1,1	1	1,2
104 banks	1	1,1	0,9	0,5

Source : ACL, *direction des études financières*, from Lescure (2010)

In addition, the lack of modern tools used by banks today hindered hardening soft information. As showed by Lemarchand (1996) balance sheets were neither standardized nor audited nor committed by law, so that SMEs did not provide such information publicly. Besides, public institutions were not design to produce quantitative figures about firms. Information were not as easy to collect and treat as it is today and information and communication technologies were still in their infancy. This must be why deposit banks were highly prudent banking actors and rarely rolled credits over. Therefore, like English commercial banks, deposit banks were principally involved in commercial loans[17].

[16] Kauffman (1914) gives an explanation of the fact through French deposit banks aversion for local favoritism. In this respect, deposit banks somehow avoided relationships with clients on purpose. It is worth adding that Kauffman, the book of which was translated from German to French, assessed this feature as a banking progress.

[17] Commercial loans ease firms' common transactions whereas industrial loans ease firms' investments.

Table 4: Number of bank branches

	local bank branches	deposit bank branches	total bank branches
1881	2017	185	2202
1891	1964	257	2221
1898	1931	579	2510
1911	1914	851	2868

Sources: BCI, collected by Rosenthal for 1898, and the author calculation

Comparing local banks and deposit banks' balance sheets might bring additional clues about banking business fragmentation. Even though most local banks balance sheets are lacking, we have collected some basic facts based on available figures. First Nishimura (1995) provides summarized data on 65 banks from French provinces in 1911 and sorts them out according to balance sheets' size. Looking at Table 5, reserves and paid up capital decrease with banks' balance sheet size. Likewise, the ratio of deposits on total resources increases, while the share of illiquid assets decreases with banks' size. As a consequence, as long as the size of the balance sheet was related to the network size, the more was the size of the network, the less the use of relationships with borrowers, the less the risk taking (Table 3 gives confirmation to this point as well). Lastly, according to balance sheets of deposit banks and 104 other banks[18] inquired by the Crédit Lyonnais in 1913 (see Lescure 2010), participations and security portfolio is equal to to 2% of deposit banks' balance sheets while the figure is 12% for the other banks (see Table 6). Therefore, local banks appear more involved in long term finance in spite of the underlying risk of immobilization[19].

Table 5: Accounts ratios, 1910 (%)

	Deposit banks	Banks with BS > Ff. 30m	Banks with BS of Ff. 10m-30m	Banks with BS < Ff. 10m
Paid up capital and reserves on balance sheets (BS)	14,5	18,1	19,3	22,4
current account debit balances on crrent account credit balances	43	75,7	88,2	106,5

Sources: ABDF: *Rapport d'inspection,* from Nishimura (1995)

[18] As argued by Lescure (2010) these banks were located outside Paris and its suburb and tie in with to local and regional banks.

[19] Such features kept on after the war since in 1926 loans from local and regional banks represented more than 65% of total bank debt for firms employing fewer than 100 people (Lescure 1996).

Table 6: Accounts in % of the balance sheet in 1913

	deposit banks	104 other banks
commercial portfolio	50,7	27,9
current account debit balances	38,8	52
participation and security portfolio	1,9	11,7

Source : ACL, *direction des études financières*, from Lescure (2010)

Lastly, let's add that by 1912, according to Roulleau's (1914) calculation only 35% of French bills were due to deposit bank transactions. Therefore, even though many bills passed by banks' vault, local banks were probably the most important lender in terms of volume. Based on the growing share of overdrafts and other industrial loans[20] in local banks portfolios, local banks' information advantage may have helped local firms' investment in significant proportion. This point is also confirmed by the fact that, from the start of the XXth century through to the war, deposit banks' balance sheets grew less quickly than inquired local banks balance sheets, showing the rising importance of local and regional banks (Lescure 1996).

Finally, since small banks have not been really inquired till recently, in the vein of the Gerschenkronian's paradigm, some academics argued that French banks barely helped finance new industries' investments. Nevertheless, such stance was reduced by the sole observation of deposit banks which, in fact, avoid such risky business. Hence, for a couple of interlocked reasons new studies have stressed different conclusions. First, local banks lent more to industry and helped SMEs investments in significant proportions. Second, as argued by Lescure & Levy-Leboyer (1991), SMEs played a major role in the start of new industries such as motor cars, electricity, and steel industry. As far as the French productive system was not subject to increasing returns to scale (Doraszelski 2004) at that time, SMEs' blooming may have thus been good for economic development. In this respect, local banks may have been part of this success since they appeared well-suited to support SMEs' projects.

However, why some banks should be better to promote risky business as competition and information asymmetries prevail? A simple model of non-cooperative game will help rationalize this point.

[20] As a matter of fact, according to Nishimura (1995), the volume of those papers re-discounted to the BdF branches is equal to 4.4% of the whole amount of outstanding bills. The figure turns to 6.8% as deposit banks bills' portfolios are withdrawn from the sample. Since credit papers were not systematically discounted to the BdF, credit papers accounted then for a significant part of outstanding bills.

IV. Small and large banks, market power, and small business finance: a model

In the present model we search for small and large banks' ability to finance SMEs projects according to borrowers' level of frisk. Therefore, we account for banks' features and look for consequences in terms of banking market repartition[21]. For a direct empirical application of the model based on the French case see the example of the Choletais described by Lescure (2002) and took up by Carnevali (2005)[22].

a. The model's framework

Let's assume that a firm needs 1 Euro to start a new project[23]. The firm can choose among two different methods. The "good" (g) method yields X_g with probability $p_g = 1$, the "bad" (b) method yields X_b with probability $p_b = p$ and zero otherwise. There are two kinds of projects' quality, high and low. The probability to meet successful (resp. unsuccessful) entrepreneur is θ (resp. $1-\theta$). In other words, $1-\theta$ can be seen as the intrinsic risk of failure of the entrepreneur's project[24]. Unsuccessful entrepreneurs systematically fail while successful ones always succeed. Also, let's assume that:

$$1 < X_g < X_b \qquad \text{(R1)}$$

$$pX_b < 1 < X_g \qquad \text{(R2)}$$

The first restriction (R1) says that bad methods are attractive due to high return when projects succeed. The second restriction (R2) shows that bad methods have negative net present values. Also, these restrictions will help to account for information asymmetry since borrowers are encouraged to choose the bad method according to circumstances.

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[21] Large and small do not refer to the volume asset but account for branches' network size.

[22] In this study, Lescure (2002) provides an example of banks and firms relationships inside the industrial district of Cholet. The inquiry shows that local banks lost large clients to national banks but defend their activity by expanding their business to small firms. Even though more risky, the dispersed localization of those firms gave a comparative advantage to local banks. In other words, proximity allowed local banks to reduce transaction costs (monitoring and assessment costs) because of long term relationships with firms.

[23] The concept of project is quite large here. It can be mere commercial transaction or investment.

[24] For instance, commercial transactions are safe due to the few reasons disclosed in the previous section. On the other hand, investments entail long term mobilization what generates incertitude and increases the probability to be hit by an exogenous shock. Moreover, small firms are more subject to bankruptcy due to high environmental dependence. Lastly, innovative sectors are more risky *per se* due to incertitude related to new products or new process.

Projects may be funded by risk neutral lenders called banks for the sake of simplicity. Two banks, small (s) and large (l), compete on the banking market and know about firms' future projects. Each bank pays a cost $c(\theta) = \gamma_i + (1-\theta)\beta$ (with $i = s,l$; $\gamma_i \in \Re^+$ and $\beta \in \Re^{+*}$) as it engages in relationships with a firm[25]. γ_i corresponds to transfer costs, infrastructure costs, and prior transaction costs need to start relationships with borrowers. Because large banks have difficulties to collect and use private information (Stein 2002) we assume $\gamma_s < \gamma_l$. In addition, γ_l is more or less high according to banks level of centralization. For instance, as we look at the German case, some large banks' provincial branches were somewhat independent in terms of lending operations, γ_l should then be low in this case. In other hand, γ_l must be higher for French deposit banks due to centralized control upon branches. Also, c is decreasing on θ for two reasons. First, information is costly to acquire when firms are risky[26] (see Boot & Thakor 2000). Second, because of information asymmetries, prior transactions with firms generate losses as risks increase (see Petersen & Rajan 1995).

Likewise, banks have to pay an additional cost d_i whatever the way they contract with borrowers. This additional cost depends on banks' liquidity access and economies of scale. Let's assume $d_l < d_s$, so that we assume increasing returns to scale[27] on banking business. It is worth underlining that liquidity costs stem from difficulties to borrow on the money market. In this respect, the market is often less confident about small banks than large banks due to lower diversification of assets and private information use. Lastly, as far as private knowledge helps monitor and advise borrowers, we assume that borrowers always choose the good project when bank pays for relationships. Based on relationship banking *raison d'être*, this indirectly means that the model ties in with a soft information economy. Therefore, hard information cannot be used to encourage firms to choose good projects[28].

The timing of the model is the following: at $t = 0$ both banks set up and choose whether to pay for private information according to borrower's projects[29]. At $t = 1$ each bank proposes a contract that defines the interest

[25] We define relationship banking according to Boot (2002) conditions: (i) The intermediary gathers information beyond readily available public information; (ii) information gathering take place over time through multiple interactions with the borrower, often through the provision of multiple financial services; (iii) the information remains confidential (proprietary).

[26] For example, new and innovative firms disclose less information on their business.

[27] As argued by Berger & Black (2010) economies of scale may come from low liquidity cost due to diversification of credits. Given the period we are studying now, this point is attested by historical inquiries (see Lescure 2010 for evidence).

[28] In other words, based on Lemarchand (1995), we do as if hard information were not available in this economy.

[29] We refer to θ and X_i. Unlike others external lenders, banks may have such information at low cost due to physical proximity with clients (Cf. Elliehausen & Wolken 1992).

rate based on the set of available information. The borrower thus decides whether to accept the contract or not. At $t = 2$ the bank is paid down as the project succeeds but loses the funds otherwise.

We suppose that the competition process follows a bid whereby the best proposition is always chosen by the firm. Therefore, the interest rate is always equal to the best proposition of the looser minus ε (assumed to be zero for the sake of simplicity)[30].

b. Information Asymmetry

Based on (R2) the bank must encourage firms to choose the good project. This point is always solved when the bank pays the cost of relationship (c), otherwise firms' limited liability leads banks to cope with adverse selection. Based on (R1) firms may be encouraged to misuse the funds, banks must thus choose the adequate interest rate (R), so that:

$$p_g(X_g - R) > p_b(X_b - R) \quad (1)$$

Due to (1), the threshold rate above which firms choose the bad project is:

$$R < \bar{R} = \frac{X_g - pX_b}{1-p} \quad (2)$$

Also, the participation constraint of the bank is:

$$\pi_{i,c=0} = \theta R - (1-\theta) - d_i \geq 0 \quad (3)$$

Let's $\pi_{i,c=0} = 0$ and $R = \bar{R}$ so as to find out ($\overline{\theta_i}$) beyond which banks cannot finance the project without paying for relationships:

$$\overline{\theta_i} = \frac{1+d_i}{1+\bar{R}} \quad (4)$$

Because $d_l < d_s$, $\overline{\theta_s} > \overline{\theta_l}$, so that we can define three distinct games according to the value of $\overline{\theta_s}$ and $\overline{\theta_l}$.

c. Games' solutions

Whether banks pay for relationships or not, we look at four distinct situations. Let's be j the large bank's choice and k the small bank's choice. Both subscripts j and k equal c when c is paid and 0 otherwise. $S_{j,k}$ then refers to banks' simultaneous choice. We follow three different steps so as to solve the game. First, we define banks' participation constraints as they pay for relationships or not. Second, we calculate the best interest rate the bid's loser can propose. Third we figure out banks' profit.

[30] This somehow ties in with asymmetric Bertrand competition model.

1) If $\theta > \overline{\theta_s}$

Let's look at the four sub-games related to this game:

i. $\boldsymbol{S_{c,c}}$: Let's define banks' profit function:

$$\pi_{i,c,\theta>\overline{\theta_s}=0} = \theta R - (1-\theta) - d_i - c \tag{5}$$

The small bank necessarily lose the bid since $d_l < d_s$. The small bank then outbid till $\pi_{i,c,\theta>\overline{\theta_s}=0} = -c$[31]. Therefore, the lowest rate the small bank is able to propose is:

$$R_{s,c,\theta>\overline{\theta_s}} = \frac{1-\theta+d_s}{\theta} \tag{6}$$

Putting (6) in the large bank's profit function, we get:

$$\pi_{l,c,\theta>\overline{\theta_s}} = d_s - d_l - c \tag{7}$$

Therefore, the solution of the sub-game is: $\{d_s - d_l - c; -c\}$. It is worth underlining that the large bank wins the bid even though its profit can be negative.

ii. $\boldsymbol{S_{0,c}}$: Like in the previous case, the best interest rate the small bank is able to propose is $R_{s,c,\theta>\overline{\theta_s}}$. Hence, the large bank profit turns to:

$$\pi_{l,0,\theta>\overline{\theta_s}} = d_s - d_l \tag{8}$$

The solution of the sub-game is then: $\{d_s - d_l; -c\}$.

iii. $\boldsymbol{S_{c,0}}$: The large bank wins the bid since its profit has to be higher than $-c$. Also, the lowest interest rate the small bank can propose is:

$$R_{s,0,\theta>\overline{\theta_s}} = R_{s,c,\theta>\overline{\theta_s}} \tag{9}$$

Thereby, the large bank profit ties in with (7), so that the sub-game solution turns out to be: $\{d_s - d_l - c; 0\}$. Still, the large bank wins the bid though its profit can be negative and lower than the small bank one.

[31] It is worth underlining that because banks pay for relationship at t = 0 they lose c when they lose the bid at t = 1. Therefore, banks are encouraged to bid till $\pi_{\theta>\overline{\theta_s},i,c=0} = -c$.

iv. $\boldsymbol{S_{0,0}}$: Now, the large bank wins the bid while the best proposition the small bank is able to do is $R_{s,0,\theta>\overline{\theta_s}}$. Therefore the large bank profit is explained by (8). The sub-game solution is: $\{d_s - d_l; 0\}$.

Is there a unique Nash equilibrium? Whatever the choice of the large bank, since c < 0 the small bank is always incited to choose the strategy c = 0. The large bank chooses its best strategy given that the strategy of the small bank is c = 0. Therefore, the unique Nash equilibrium is $\boldsymbol{S_{0,0}}$.

		Small bank	
		c	0
Large bank	c	$\{d_s - d_l - c; -c\}$	$\{d_s - d_l - c; 0\}$
	0	$\{d_s - d_l; -c\}$	$\{d_s - d_l; 0\}$

Figure 1: Game matrix if $\boldsymbol{\theta > \overline{\theta_s}}$

Proposition 1: *As long as $\theta > \overline{\theta_s}$, (i) loans are always provided by large banks, and (ii) large banks use arm's length lending technology.*

2) If $\theta < \overline{\theta_l}$

Let's proceed with the same method as above and compare results according to banks' choice.

i. $\boldsymbol{S_{c,c}}$: Insofar as $d_s > d_l$ this case is the same as $S_{c,c}$ when $\theta > \overline{\theta_s}$. Therefore, the solution of the sub-game is: $\{d_s - d_l - c; -c\}$.

ii. $\boldsymbol{S_{0,c}}$: the small bank wins the bid automatically. Because the large bank cannot compete, the small bank expropriates the borrower totally. Therefore, $R = X_g$[32], so that the small bank can lend till:

$$\theta > \widehat{\theta_s} = \frac{1+d_s+\gamma_s+\beta}{1+X_g+\beta} \qquad (10)$$

The solution of the sub-game is then: $\{0; \pi_{s,c,\theta<\overline{\theta_l}}(\theta)\}$

[32] Basically, the interest rate might be lower since the borrower has a credible threat insofar as the bank has already paid c. However, without loss of generality and for the sake of simplicity we have assumed full expropriation of borrowers.

iii. $\boldsymbol{S_{c,0}}$: the large bank wins automatically the bid. For the same reason as above, $R = X_g$, so that the large bank can lend till:

$$\theta > \widehat{\theta_l} = \frac{1+d_l+\gamma_l+\beta}{1+X_g+\beta} \tag{11}$$

The solution of the sub-game is thus: $\{\pi_{l,c,\theta<\overline{\theta_l}}(\theta); 0\}$

iv. $\boldsymbol{S_{0,0}}$: the transaction is impossible by hypothesis, therefore the solution of the sub-game is: $\{0; 0\}$.

		Small bank	
		c	0
Large bank	c	$\{d_s - d_l - c; -c\}$	$\{\pi_{l,c,\theta<\overline{\theta_l}}(\theta); 0\}$
	0	$\{0; \pi_{s,c,\theta<\overline{\theta_l}}(\theta)\}$	$\{0; 0\}$

Figure 2: Game matrix if $\boldsymbol{\theta < \bar{\theta}_l}$

Is there Nash equilibrium in this game? Let's go back to $S_{c,c}$. The participation constraint of the large bank means that $c(\theta) < d_s - d_l$. Because $c(\theta) = \gamma_l + (1-\theta)\beta$ the constraint holds till:

$$\theta > \dot{\theta} = 1 - \frac{d_s - d_l - \gamma_l}{\beta} \tag{12}$$

According to the gain matrix, the large bank is always incited to pay for relationship above this cut off level of risk. Based on this result the small bank chooses to avoid relationships, so that $S_{c,0}$ is the unique Nash equilibrium. Before this point, the game gets two Nash equilibriums ($S_{0,c}$ and $S_{c,0}$) till $\max[\widehat{\theta_l}; \widehat{\theta_s}]$. Therefore, as banks cannot anticipate the choice of the other competitor, there is no clear solution as long as $\theta \in \{\max[\widehat{\theta_l}; \widehat{\theta_s}]; \dot{\theta}\}$, every combinations are then possible. Lastly, the most competitive bank for risky business gets the remaining market till $\min[\widehat{\theta_l}; \widehat{\theta_s}]$.

Proposition 2: *as long as $\theta < \overline{\theta_l}$, banks must use relationship banking to do business, so that: (i) the large bank takes up the market as long as $\theta \in \{\overline{\theta_l}; \dot{\theta}\}$; (ii) borrowers may start relationships with any bank if $\theta \in \{max[\widehat{\theta_l}; \widehat{\theta_s}]; \dot{\theta}\}$; also, borrowers may be credit constrained insofar as banks'*

anticipation leads to $S_{0,0}$; (iii) the most competitive bank for risky business wins the market when $\theta \in \{min[\widehat{\theta_l}; \widehat{\theta_s}]; max[\widehat{\theta_l}; \widehat{\theta_s}]\}$.

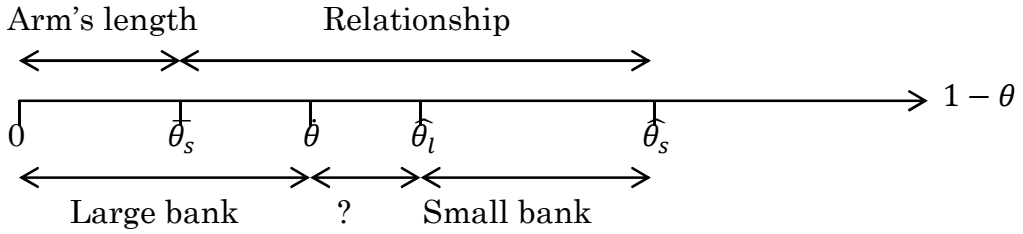
3) If $\theta \in \{\overline{\theta_l}; \overline{\theta_s}\}$

Herein the large bank is the unique lender able to use arm's length lending technology. However, as it pay c the large bank can get higher profits. Since the large bank can fund borrowers without paying for relationships, the small bank cannot win any bid and never pays for relationship. Thereby, the large bank chooses to pay for relationship if $\pi_{l,0,\theta>\overline{\theta_l}} < \pi_{l,c,\theta>\overline{\theta_l}}$, such as:

$$\theta > \check{\theta} = \frac{\gamma_l + \beta}{X_g + \beta - \bar{R}} \quad (13)$$

d. Model's results

Let's assume that $\check{\theta} \in \{\widehat{\theta_l}; \overline{\theta_s}\}$ for the sake of simplicity. One important question remains: what bank matches $\max[\widehat{\theta_l}; \widehat{\theta_s}]$? The answer depends on d_i and γ_i. As far as $d_s + \gamma_s < d_l + \gamma_l$, $\max[\widehat{\theta_l}; \widehat{\theta_s}] = \widehat{\theta_l}$. Conversely, $d_s + \gamma_s > d_l + \gamma_l$ means that $\max[\widehat{\theta_l}; \widehat{\theta_s}] = \widehat{\theta_s}$. Looking at the French experience of the classical period, the historical inquiry has shown that $d_s + \gamma_s < d_l + \gamma_l$ is the most probable solution. Indeed, γ_l must have been very high based on the weak independence of deposit bank branches. Meanwhile, BdF re-discount facilities (Bazot 2010) helped local banks cope with liquidity costs[33], so that γ_s may have been sufficiently low to compensate scale disadvantage. Small banks must thus have taken up the risky part of the banking market due to overwhelming advantage in private information management. Thereby, let's sum up the model's result with the following graph:



Graph 1: model's result

[33] It is worth noting that the Bank of England indirectly encouraged banks to merge in the sense that provincial banks were had no access to re-discount facilities. Therefore, d_s may have been so big for small banks that profits went down. Large banks, on the contrary, coped with this issue due to geographical diversification of activities. Both points then came up with concentration of the English banking market.

Also, those results have some consequences in terms of microeconomics of banking literature. First, competition may trigger credit constraints due to banks' uncoordinated strategies. Such argument may justify the coordination of the banking industry, what somehow ties in with Gerschenkronian's stance. Second, along with Uchida & al. (2008) large banks may use relationship banking even though they appear less able to manage private information than small banks. Third, the riskiest part of the market is taken up by small banks as long as comparative advantage in soft information management outweighs economies of scale disadvantage. In other words, as long as soft information transfer inside banks is not too costly $d_l + \gamma_l$ may be inferior to $d_s + \gamma_s$, so that $\widehat{\theta_l} < \widehat{\theta_s}$. This fits Berger & Udell (2006) argument about large banks ability to finance risky projects due to increasing returns to scale in banking business. Fourth, along with the dominant paradigm in small business lending, safe borrowers are always financed by large banks.

Thereby, based on the model's results, the French banking market can be separated in three parts: new and innovative firms and SMEs rely on small (local) banks whereas old, large and, well implanted firms rely on large (deposit) banks[34]. Firms with intermediate level of risk can be financed either by small banks or large banks.

e. Consequences for French economic development

What are the consequences of these outcomes in terms of economic development? Based on the model's results, local and deposit banks may have been more or less useful according to the economic environment at stake. Therefore, let's present some arguments regard to banks' type and the French productive landscape.

Let's first deal with local banks. Based on the model we have just designed and the shape of the French economy of that time, four points have to be held up as to the consequence of local banking on economic development. First, insofar as new and innovative industries were mainly led by new firms till the WWI (Levy-Leboyer & Bourguignon (1985), Caron (1999); see also the discussion on patents below), local banks may have helped start new and innovative projects. Second, because the French industry was mainly made up of SMEs, firms' investments must have been financed by local banks. On the other hand, and this is the third point, local banks may have delayed the emergence of large firms and hampered the positive effect of increasing returns to scale (Sicisic 1994). However, the analysis of Doraszelski (2004) contradicts this view and shows that the French economy was subject to constant returns to scale in the second half

[34] Such firms either auto-financed themselves or used financial market for their investments.

of the nineteenth century. Size effects may thus not have played that much. Fourth, local banks' advantages may have been useless in stagnant (rural) areas due to low volume risky projects such as investment or the adoption of innovation.

By the same token, deposit bank features come up with a couple of arguments. First, deposit banks may have promoted growth through saving mobilization (Cf. Levine 2005). Based on the French historical context this point is however quite controversial. For instance, because of limited demand of safe and short term loans in France, many foreign projects were financed with savings deposits overflows (Bouvier 1979). Therefore, deposit banks' savings deposits were not used for French investments, what could offset so-called saving mobilization's positive effect. Second, even though deposit banks' loans were rarely used for investments[35] liquidity provision may have relieved companies' liquidity constraints and unleashed illiquid investments. Nevertheless, because the French industry of the classical period was mainly made up of SMEs, and because deposit banks avoided such risky borrowers, this may have not played so much.

To sum up, local and deposit banks are differentially useful according to local activities at work. Based on the underlined trade-offs, we expect local banks relative effectiveness[36] in industrial, and innovative areas. As a matter of fact, some deposit banks offices had to shut off due to unprofitable activities in some industrial areas (Kauffmann 1914)[37]. On the other hand, local banks may have not brought about economic development in stagnant (rural) regions for the few reasons disclosed above.

V. Empirical analyses

a. Econometric tests

Causal models in macroeconomics are quite difficult to implement as endogenous biases are often at play. Furthermore, instrumental variables are not systematically available, especially in historical inquiries. However, robust correlation may be better than poor causality as long as we account for omitted variable bias. Control variables and fixed effects are then used to cope with this issue.

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[35] In addition to what has been said in the theoretical part of this paper, the traumatic experience of the 1882 crisis and the high share of short term deposit may have impeded monetary transformation as well.

[36] It is relative to deposit banks effectiveness.

[37] For instance, according to the inquiry of *la France Economique* (19/12/1905) in the industrial department of Meurthe-et-Moselle, local banks turnovers was Ff. m. 2800 in 1904 while deposit banks turnovers was Ff. m. 900.

Therefore, the empirical strategy has to underpin some points. First, are local banks better than deposit banks to promote economic development? Is this result conditional to the share of non-agricultural activities? Second, are local banks better to proceed to innovative firms' selection? Still, is it conditional to the share of non-agricultural activity?

We have collected a pool of variables per French *département* for all ten years from 1881 to 1911 in this regard. Given the first objective, the first implemented test is:

$$g_{i,t+1} = \alpha\left(\frac{LOC}{BK}\right)_{i,t} + \mu\left(\frac{LOC}{BK}\right)_{i,t} \times \left(\frac{URB}{POP}\right)_{i,t} + \lambda\left(\frac{URB}{POP}\right)_{i,t} + \sum_j \rho_j C_{i,j,t} + \varepsilon_{i,t} \qquad (14)$$

With g the GDP per capita growth from t to t+1, LOC the figure of local bank branches, BK the total number of branches, URB the urban population, POP the number of inhabitant, C the set of control variables, ε the residual, and j the control variable index. LOC/BK is an indicator for the relative access to local banking[38]. The equation implements an interaction term that helps account for the conditional effect of LOC/BK according to the share of urban population. The share of urban population is used here as an indicator of the share non-agricultural activity[39]. The interaction term is then the turning point of the econometric specification as far as we have hypothesized local banks' conditional positive effects.

The set of control variable is: the number of firm per capita, population density and, a proxy of innovation ability (INN). Innovation ability is calculated through the tax on patent controlled by urban population. Lastly, all regressions add temporal and *département* fixed effects. Fixed effects help control for hiding factors, imperfectness of the data, and omitted variable bias. For instance, because we use the number branch per bank rather than banks' assets size we should have to assume that the ratio of local bank branches' average size ($\overline{LBB}$) on deposit bank branches' average size ($\overline{DBB}$) is homogenous across *département* at any time. Fixed effects help reappraise the hypothesis, so that we now assume ($\overline{LBB}/\overline{DBB}$) homogenous over time for each *département* given the average evolution of the ratio in all *départements*. In this respect, as long as we accept this hypothesis, the ratio LOC/BK can somehow be interpreted as local banks' market share due to fixed effects implementation.

Also, LOC/BK is an interesting ratio for two reasons. First, it entails few risks of simultaneity bias. Indeed, the ratio is calculated with initial values regard to growth calculation. Besides, even though growth perspective may have an impact on banks' choice to set up new branches,

[38] It is relative to deposit banks' access.

[39] We do not use the share of non-agricultural activity since the calculation of this ratio depends on GDP. Thereby, this may entail a bias as the dependent variable is GDP per capita growth.

there is no reason for that effect to be higher with local banks than deposit banks[40]. Second, As BK = LOC + DEP (DEP is the number of deposit bank branches), LOC/BK is equal to 1 minus the relative access to deposit banks ($LOC/BK = 1 - DEP/BK$). In other words, the effect of the relative access to deposit bank is indirectly assessed by the econometric specification. Therefore, the estimation of μ and α will provide us with the effectiveness of both banks type at the same time.

As underlined above, local banking is theoretically more able to work with innovative and promising firms. Therefore LOC/BK may be positively correlated with the ability to innovate as well. Hence, we test for:

$$INN_{i,t+1} = \alpha \left(\frac{LOC}{BK}\right)_{i,t} + \mu \left(\frac{LOC}{BK}\right)_{i,t} \times \left(\frac{NAP}{GDP}\right)_{i,t} + \lambda \left(\frac{NAP}{GDP}\right)_{i,t} + \sum_j \rho_j C_{i,j,t} + \varepsilon_{i,t} \quad (15)$$

GDP is gross domestic product, and NAP is the non-agricultural output. Control variables are, GDP per capita, the number of firm per capita, and the population density. Note that the *département* of Seine-et-Oise is removed due to the effect of Paris proximity.

Also, the question of selection needs more than a mere comparison between local and deposit banks. We thus have to deal with the specific effect of local bank density (LOC/POP). Likewise, in order to show that such results are solely related to local banking, we also look for the effect of deposit bank density (DEP/POP) and bank density as a whole (BK/POP). Thus we add the following tests:

$$INN_{i,t+1} = \alpha \left(\frac{LOC}{POP}\right)_{i,t} + \sum_j \rho_j C_{i,j,t} + \varepsilon_{i,t} \quad (16)$$

$$INN_{i,t+1} = \alpha \left(\frac{DEP}{POP}\right)_{i,t} + \sum_j \rho_j C_{i,j,t} + \varepsilon_{i,t} \quad (17)$$

$$INN_{i,t+1} = \alpha \left(\frac{BK}{POP}\right)_{i,t} + \sum_j \rho_j C_{i,j,t} + \varepsilon_{i,t} \quad (18)$$

We do not implement interaction term anymore as local banks should theoretically select the most promising firms whatever the kind of business at work. The correlation between innovation ability and local banks should then be constant in space and time.

Before proceeding to econometrics' results, let's present the sources and basic statistical figures related to the empirical strategy.

[40] According to the American experience inquired in James (1981) this should even be the opposite.

b. Sources and basic statistics

How to measure of innovation? Because French data about individual patent are not fully available, along with economics of innovation literature we use the amount of the patent tax. This tax has four main features. First, annuities are constant, so that patent owners pay Ff. 100 per year of protection. Hence, the sum of annuities depends on the period of protection. Second, a patent cannot last more than 15 years. Third, a patent is granted as long as the tax is paid at the start of each year. Fourth, as the owner sell the patent the remaining amount of the tax is collected in the *département* office of the depositor. What are the consequences of such patent system? First, Ff. 100 represents important wealth in France at that time, so that the tax is relevant for worthy inventions only. Second, as soon as patents are worthless owners can stop pay in for them. Almost half of patents passed away after two years and, only 15% of them all stayed alive after 10 years (Galvez Behar 2008). In other words, the tax must be paid up as long as the patent entails positive expected profits. Therefore, the tax helps somehow to account for inventions' value. Third, the tax rules out cycles and shocks (Galvez Behar 2008). Lastly, innovation is an urban activity, so that urban population is a good denominator to account for innovation ability.

Let's add two points. First, the département of Paris is withdrawn. Foreign patents bias has motivated this choice since foreigners asked for patents in Paris. Consequently, the tax encompasses almost 3000 patents every year. Second, according to Lamoreaux & Sokoloff (2001) several inventors may have been incited to deposit patents in other areas due to "market for patents" facilities. Insofar as we use fixed effects in econometric models, we just assume the phenomenon constant over time. Anyway, this point does not really matter since "market for patents" did not exist in France at that time. Indeed, as argued by Khan & Sokoloff (2004) and Galvez-Behar (2008), the weak examination of patents could not insure either the quality or the originality of the invention. Thereby, firms were not incited to buy them out. This is all the more true since information on patents was poorly disclosed to the public[41]. As a matter of fact, patent's cessions were uncommon practice in France. For instance, the number of cessions is equal to 36 in 1878 and 91 in 1898[42]. Also it is worth notint that buyers and sellers came mainly from the same *département* (more than 80% if we do not account for transaction with foreigners). Because firms bought patents on production purpose, this shows that inventions tie in with local industry

[41] "The attempt to obtain information was also inhibited by restrictions placed on access - viewers had to state their motives; foreigners had to be assisted by French attorneys; and no extract from the manuscript could be copied until the patent had expired." (Khan & Sokoloff 2004)

[42] We include cessions to foreigners and patents' retro-cessions in the calculation. Numbers dwindle dramatically as we remove these cases (22 in 1878 and 59 in 1898).

Table 7: Descriptive statistics: mean and standard deviation

	1880	1890	1900	1910
Innovation ability	0.40	0.32	0.26	0.24
	[0.33]	[0.34]	[0.22]	[0.26]
Share of local bank branch	0.95	0.92	0.80	0.68
	[0.04]	[0.05]	[0.10]	[0.10]
Local bank branches per capita	0.60	0.60	0.57	0.56
	[0.27]	[0.24]	[0.24]	[0.25]
Deposit bank branches per capita	0.03	0.04	0.14	0.24
	[0.02]	[0.03]	[0.08]	[0.09]
GDP per capita	0.57	0.61	0.72	0.74
	[0.17]	[0.19]	[0.23]	[0.21]
Population density	0.67	0.68	0.68	0.68
	[0.36]	[0.39]	[0.44]	[0.48]
Share of urban population	0.26	0.28	0.30	0.32
	[0.14]	[0.15]	[0.16]	[0.17]
Firm per capita	0.46	0.49	0.52	0.56
	[0.11]	[0.12]	[0.11]	[0.11]
Share of non-agricultural output	0.49	0.56	0.60	0.57
	[0.13]	[0.13]	[0.13]	[0.14]

N=84 for each year. Innovation ability is the tax per hundred of urbanized inhabitants. Local bank per capita is the number of local bank branches per ten thousands inhabitants. Deposit bank per capita is the number of deposit bank branches per ten thousands of inhabitants. GDP per capita is GDP per ten thousands of inhabitants. Firm per capita is the number of firms per hundred of inhabitants.

The *bulletin officiel de la propriété industrielle* and the *bulletin des lois* help bring out additional information about patents and depositors[43]. First, the share of companies' (*sociétés anonyme*)[44] patents is smooth and

[43] The *bulletin des lois* displays information on depositors if they are not represented by an attorney, and provides a very brief description of patents.
[44] Figures are available for companies only.

small, even though the trend tends to increase at the early start of the XXth century (almost 8% in 1905 and 18% in 1913, Galvez-Behar 2008). Second, industrial *départements* are mainly made up of "industrial" patents. For instance, the industrial *département* of Grenoble comes up with many electro-chemical patents.

Let's present the other sources quickly. The INED website[45] provides population censsus per French *département*. Jobert (1991) gives the business tax. The *Bottin du Commerce et de l'Industrie* is used to evaluate the number of bank branches[46]. Credit development and GDP per capita are provided in Bazot (2011)[47].

Table 7 provides some descriptive statistics. Let's finally add some comments about banking quantitative figures. First, local banks set up more branches than deposit banks in industrial and dynamic *départements* over the period (see for instance the *départements* of Grenoble and Lille). Therefore, along with the arguments disclosed in the previous sections, industrial activities may have attracted local banks business[48]. Second, the same result occurs in some rural areas as well (see for instance the *département* of Lozère). Thus, rural activities may have repulsed deposit banks due to low profit expectations.

c. Results

Let's first take a look on growth results. Local banks' market share is positively related to GDP growth as long as the share of urban population is high enough. Corollary, when the share of urban population is low, local banks' market share reduces growth. The ratio turns insignificant as the interaction term removed. Hence, local banks help to the development of dynamic sectors as suggested by our hypotheses.

Results are robust whatever the set of control variables we use. According to the first regression related to (14), GDP per capita growth is higher by 2.5% as the relative access to local banks rises by ten percentage points and the share of urban population matches the median. This result turns to 5.6% in the 75% case and -1.8% in the 25% case[49]. The graph 2 exhibits the conditional correlation between GDP per capita growth and

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[45] www.ined.fr

[46] We are grateful to Jean-Laurent Rosenthal for 1898 data.

[47] The accuracy of GDP has been tested based on Toutain's calculation for 1862 (see Combes & al., 2011). According to the test our GDPs are very similar to Toutain's GDP: $R^2 = 0.98$ and 0.95 without the *département* of Paris.

[48] It is worth noting that it may have chased deposit banks as well. For instance, According to Plessis (1999) deposit banks removed some branches in Meurthe-et-Moselle due to unprofitable business. It seems indeed that deposit banks were somehow unable to provide adequate services to industrial needs.

[49] These figures account for all 10 years. For instance, admit that GDP equals 100 at t, if local bank branches share increases by 10% whereas the share of urban population corresponds to 75% case, GDP per capita is equal to 106 at t+10, *ceteris paribus*.

LOC/BK according to the share of urbanized population. It shows that the relative access to local banking is positively correlated with GDP per capita growth as far as the share of urbanized population is superior to 21%[50]. Likewise, the correlation's coefficient rises by 0.06 point when the share of urbanized population increases by 10%. Lastly, as expected, initial value of 'innovation ability' is positively and significantly correlated with growth.

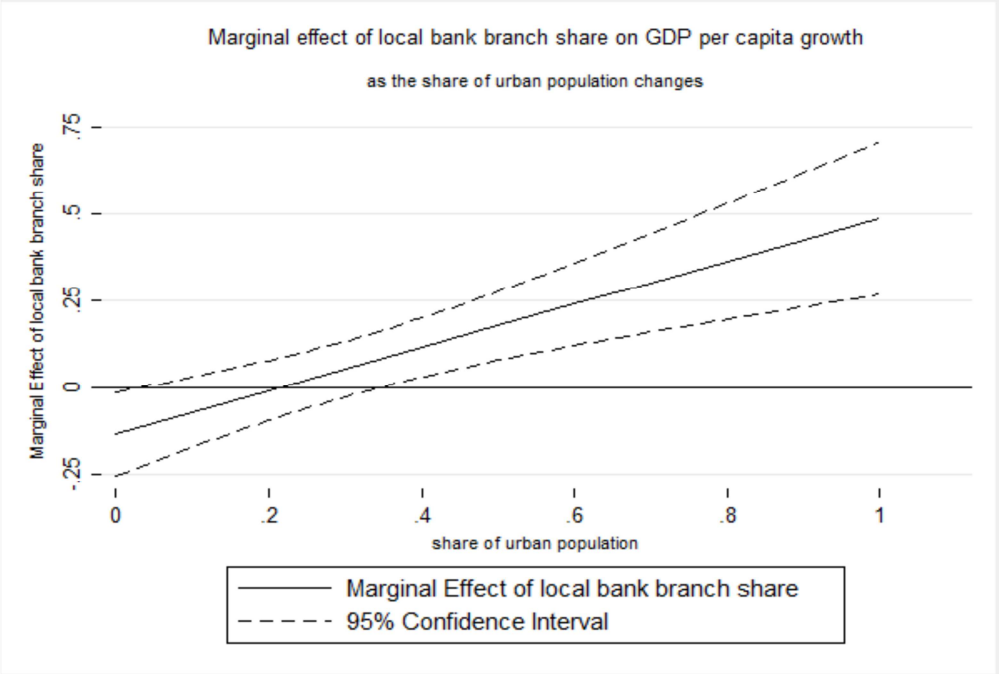
Table 8: Determinant of GDP per capita growth

	GDP per capita growth			
Share of local bank branch [A]	-0.133**	0.039	-0.134**	0.046
	(0.061)	(0.047)	(0.067)	(0.047)
Share of urban population [B]	-0.530***		-0.490**	
	(0.166)		(0.215)	
[A]×[B]	0.620***		0.631***	
	(0.152)		(0.171)	
Population density			-0.000	-0.001***
			(0.000)	(0.000)
Firm per capita			-1.856**	-1.708**
			(0.827)	(0.840)
Innovation ability			0.224**	0.228***
			(0.086)	(0.087)
Constant	0.132	-0.007	0.231**	0.361***
	(0.139)	(0.047)	(0.107)	(0.095)
Observations	249	249	249	249
R-squared	0.82	0.80	0.83	0.81

***, **, * significant at 1%, 5%, and 10% confidence, standard errors into brackets. Panel regression on department basis with temporal and *département* fixed effects.

[50] This corresponds to 77% of the given panel.

Graph 2: LOC/BK marginal effect on GDP growth



Graph 3: LOC/BK marginal effect on innovation

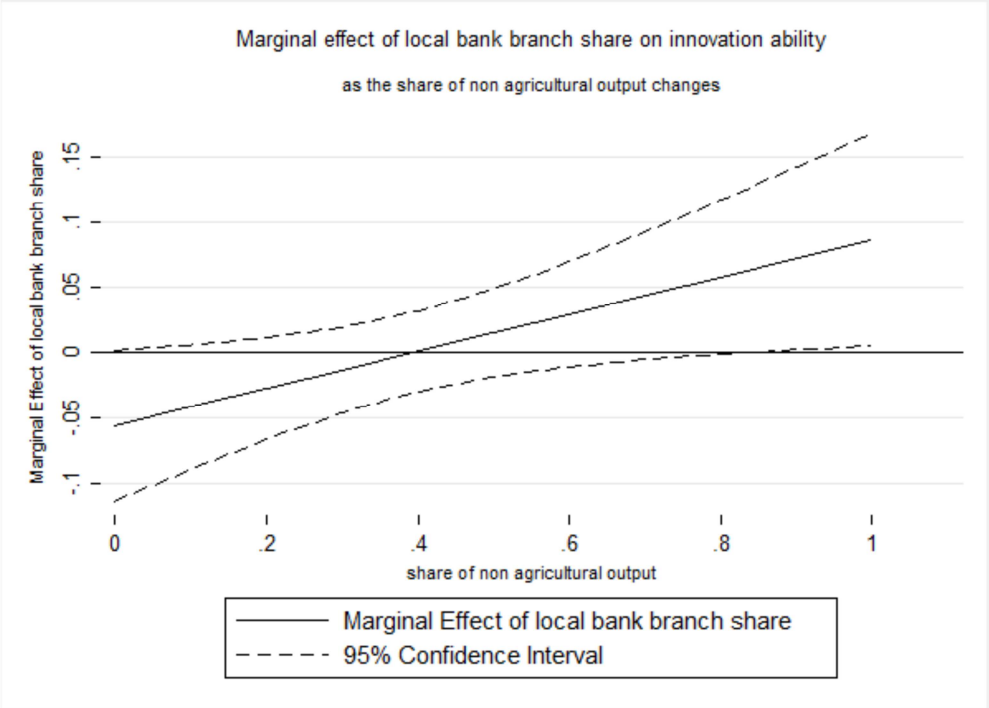


Table 9: Determinant of innovation ability

	Innivation ability			
Share of local bank branch [A]	-0.056*	-0.106***	0.017	0.016
	(0.029)	(0.036)	(0.017)	(0.017)
share of nonagricultural output [B]	-0.162***	-0.250***		
	(0.050)	(0.066)		
[A]×[B]	0.142**	0.230***		
	(0.063)	(0.077)		
Population density		0.049**		0.016
		(0.021)		(0.017)
GDP per capita		-0.005		-0.006
		(0.019)		(0.015)
Firm per capita		-0.163		-0.270
		(0.527)		(0.551)
Constant	0.078***	0.125***	0.008	0.009
	(0.025)	(0.038)	(0.017)	(0.028)
Observations	332	332	332	332
R-squared	0.78	0.78	0.77	0.77

***, **, * significant at 1%, 5%, and 10% confidence, standard errors into brackets. The dependent variable is the amount of the patent tax divided by urban population. Panel regressions on *département* basis from 1881 to 1911 with time and *département* fixed effects.

Innovation results follow the same path. The ratio of innovation ability is positively and significantly correlated with local banks' market share as long as the share of non-agricultural output is high enough. According to the first regression related to (15), 'innovation ability' is higher by 8.5% (given the mean of the ratio) when the ratio rises by ten percentage point and the share of non-agricultural output matches the median. This result turns to 15% in the 75% case and 3.6% in the 25% one. The graph 3 exhibits the conditional correlation between 'innovation ability' and LOC/BK according to the share of non-agricultural output. It shows that the relative access to local banking is positively correlated with innovation ability as far

as the share of non-agricultural output is superior to 39%[51]. Moreover, the correlation's coefficient rises by 0.01 point when the share of urbanized population increases by 10%.

Table 10: Innovation correlations with banks' type

	[1]	[2]	[3]	[4]
LOC/POP	0.28***	0.14*	0.19***	0.13**
	[0.07]	[0.08]	[0.07]	[0.07]
fixed vs randm	random	fixed	random	fixed
temporal dummies	no	no	yes	yes
R^2 *within*	0.14	0.19	0.18	0.19
N	332	332	332	332
	[5]	[6]	[7]	[8]
BK/POP	0.12*	0.07	0.17**	0.12*
	[0.07]	[0.06]	[0.07]	[0.06]
fixed vs randm	random	fixed	random	fixed
temporal dummies	no	no	yes	yes
R^2 *within*	0.06	0.14	0.16	0.19
N	332	332	332	332
	[9]	[10]	[11]	[12]
DEP/POP	-0.55***	-0.19	-0.12	-0.11
	[0.13]	[0.15]	[0.21]	[0.19]
fixed vs randm	random	fixed	random	fixed
temporal dummies	no	no	yes	yes
R^2 *within*	0.05	0.17	0.16	0.18
N	332	332	332	332

***, **, * significant at 1%, 5%, and 10% confidence, standard errors into brackets. All regressions add the share of non-agricultural output, GDP per capita and, population density.

Furthermore, 'innovation ability' is significantly correlated with local banks' market size (LOC/POP). As the figure of local bank branches per thousand of inhabitant increases by one point (what corresponds to 1/13 of $max(LOC/POP) - min(LOC/POP)$) 'innovation ability' rises by 4.5% regard to

[51] This corresponds to 74% of the given panel.

the mean of INN. On the other hand, the number of bank branches per capita is less influent[52] while the number of deposit bank branches per capita is not influent at all (see table 10).

Results remain positive and significant as we remove temporal dummies. However, the contrast turns bigger in this case. This result is a highly encouraging regard to 'market for patents' issue. Indeed, if such market had existed along the period, both temporal and geographical fixed effect should have changed the outcomes dramatically. Let's add that control variables do not influence the results at all, so that we only report banking variables result to save space.

d. Interpretation of econometrics outcomes

Why should local banks be related to growing and innovative industry as the results are suggesting? Even though the theoretical model provides clues on local banks' ability to finance industrial risky projects it does not build the bridge between local banking and innovation and growth. So, econometrics tests come up with two possible explanations of results based on causality at work. First, inventions came up before firms/banks relationships. Therefore, local banks may have eased the investment related to the invention, directly or not. Second, firms/banks relationships came before inventions. As long as banks' expected returns relied on firms inventiveness and technical improvements, local banks' may have promoted (directly or not) innovation through the selection of good projects.

The first point deals with reverse causality in the econometrics specification. What then means the correlation? Is it because firms were innovative that local bank branches were numerous compare to deposit bank branches? In other words, does innovation gave advantage to local banking? Insofar as innovations come with investments, local firms had to cope with long term (risky) funds to pursue their projects. Unlike deposit banks, unable to provide such loans, local banks were more suited to do business with innovative firms due to accurate private knowledge. Because local banks' profitability may have depended on the rent extracted with private knowledge, local banks may have been more profitable where such business occurred.

In this respect, because the level of investment depends on industrial activities, we also get conditional, positive, and significant correlations between local banking and GDP per capita growth. To sum up, innovative firms from industrial areas borrowed to local banks what increased investment, productivity, and growth.

A quite different story is however at work when we change the direction of causality.

[52] Even though it encompasses the number of local bank branches.

Along with the Schumpeterian paradigm about finance consequences towards innovation and growth, let's deal with bank selection effects. Because information is costly to pool and liquidity costly to get, local banks choose to pay for relationships as long as expected gains offset expected costs. Likewise, relationship's costs prevent local banks from providing loans to all profitable firms of the area. Thanks to private information management, local banks are however able to select firms that promise highest expected profit. As far as local banks' profitability hinges on firms' dynamism, firms with highest innovative features are thus selected by local banks. Therefore, due to local banks' selection effect, promising and innovative firms are able to develop their business. In other words, as far as local banks and firms interests converge, local banks may have helped firms' innovative activities[53]. In this respect, because dynamic and innovative firms belong to industrial areas, the correlation appears conditional to the importance of local dynamism.

Let's finally deal with the interlocking case. Since banks help firms get funds, investments increase firms' productivity and potential growth. Moreover, as far as banks choose the most promising projects, firms are often good enough to make innovations in the future. There is thus a couple of reinforcing positive effects in the long run[54].

VI. Discussion

We would like to add some points of discussions. First, because the BdF was an influent actor of the banking system of that time, it might be useful to assess its policy based on those new results. Second, how to assess deposit banks expansion? Third, does the Paris *département* matter for the interpretation of results? Fourth, what this study adds on the 'German versus English banking' debate?

a. What assessment of the Banque de France policy?

In a recent contribution, Bazot (2010) has shown that the BdF network of branches helped improve firms' access to credit. In this respect, the union with local banks was put in front of the demonstration. Because of the BdF services, local banks substituted reserves with re-discountable bills as soon as the BdF set up a branch. The amount of local bank credits increased and liquidity constraints went down. Thereby, BdF branches helped to local credit development in a significant way.

Nevertheless, one may fear that local banking thriving business kept the banking system in an archaic shape. Insofar as deposit banks were the

[53] We do not say that local banks triggered innovation. However, they may have at least financed it.

[54] In other hand, arguments shift as we look at non-agricultural areas.

unique alternative to local banks, the BdF may have repel the overwhelming ascent of large banks business. However, as previously showed, local banks seemed more suited than deposit banks to promote SMEs investments and innovative projects. The BdF policy was then part of dynamic firms' success[55]. Unless credit development had negative consequences for growth (what seems highly improbable), the BdF branches helped promote new businesses and local industrialization.

b. What about deposit banks?

Even though local banks appeared more able than deposit banks to bring economic development about, deposit banks need a reappraisal. First deposit banks were part of the banking system so that they guided other banks' credit policies. As documented by Lescure (2010) (see table 3), local banks changed their asset portfolios due to deposit banks' competition. Because deposit banks took up safe commercial bills business, local banks enlarged their loans to firms' investments.

The same argument holds about BdF local policy. Deposit banks somehow led to the BdF union with local banks, so that BdF branches' positive effect must be evaluated according to this fact. Therefore, the economic position of the BdF indirectly hinged on deposit banks expansion.

Let's note finally that local banks market share is negatively correlated with growth in agricultural areas. This may either be due to local banks negative effects or deposit banks positive effects. The latter point is all the more conceivable since deposit banks increased local "monetization" despite rural people's reluctance vis-à-vis modern money tools (Saint-Marc 1983).

c. Paris issue

Since we have removed Paris' district from the econometrics specifications it may be fair to discuss the consequences of this choice. Insofar as Paris is the main city in terms of patents' deposits, one might argue that the empirical work overlooks half of the phenomenon. Notwithstanding this comment, adding Paris to regressions enhances the quality of estimations. Indeed, Paris had many local banks, the number of which grew up along the period. In spite of fixed effects, this would have generated an isolated point and would have finally played for us.

Another bias might stem from potential economic gap between Paris and the rest of France (Bazot 2011). One may argue that Paris provided the elite to the rest of the country. Moreover, innovations from Paris might have been the most important ones. The first issue does not matter since the interesting point is not the explanation of the whole innovative process but the mechanisms from local banking to innovation, investment, industrial

[55] Let's note that Nishimura (1995) assessed that BdF branches contributed to 6.5% of French investments.

productivity, and growth. The second issue can be solved with qualitative analysis. Observing patents' description revealed in the *bulletin des lois* provides information on patents' types and helps figure out patents' expected influence. For instance, commercial patents should be less influent than industrial patents. In this respect, accurate inquiry of the source has not given evidence of outperforming patents in Paris.

d. English and German banks efficiency

What can be argued on 'German versus English banking' debate in the light of this study? Because the English banking system is very concentrated, results are suggesting German advantage through private information management. German banking structure may then have been good for investments due to high ability to cope with SMEs' industrial needs. Therefore, as long as innovation and growth hinged significantly on new and medium size firms, German banking advantage, if any, may have stemmed from close connections with industry. At the opposite, English banking disadvantage, if any, may have been related to business distance[56] with borrowers.

In this respect, it is worth noting that English banks have been subject to similar critics that French deposit banks as to the use of savings deposits. For instance some argued that commercial banks were too conservative and did not support private sector enough (Baker & Collins 2003). They also increased dramatically foreign banking operations (especially acceptance) due to British foreign investments growth (Carnevali 2005). Because the city of London was the turning point of international finance, English commercial banks were then naturally encouraged to rely on foreign business more extensively. In this respect, English joint stock banks were somehow too close to the interest of the City of London at the expense of English local industry. Conversely, due to local features German banks were encouraged to support non-bank private sectors. German capitals were then used for German investments.

However, we must stay prudent as to the quality of this comparison. First, English commercial banks were probably less "timorous" than French deposit banks and used a wider range of credit tools to cope with industrial needs (Collins 1998). Second, institutional specificities prevent us from tough conclusions without deep inquiry of national systems. For instance, financial markets were more influent in England than in France and Germany, so that English firms may have got long term capitals more easily on the market[57] (Michie 1999). However, this point remains controversial as far as domestic firms carrying out initial public offerings (IPOs) from the start of the XXth century through to the war turn out to be lower on the

[56] Distance is either cultural or geographical.

[57] The access to financial markets in England remained however quite limited for domestic SMEs.

London Stock Exchange (LSE) than on the Berlin Stock Exchange (BSE) (Burhop & al. 2011). In addition, the average age of companies carrying out IPOs appears far lower on the BSE, even though the special settlement of the LSE was made up of very young enterprises.

VII. Conclusion

This paper argues that banking structure matter for French development of the classical period. In this respect, we showed that local banking influences industrial businesses dramatically. This result stems from local banks ability to pool and use private information. In other hand, the structure of deposit banks network impeded such a knowledge precision. Consequently, because industrial credits are uncertain *per se*, local banks appeared more suited to deal with industrial projects. Local banking correlation with innovation is the empirical justification of such theoretical stance.

Conclusions are hard to transpose but they may shed some lights on the debate about banking system efficiency. For instance, because German banking system was more dispersed than English banking system, German industrial success during the *keiserreich* might have come from private information management advantage rather than so called specific features of German universal banks. Also, because the management of private information hinges on banks' size, banking concentration might have hampered innovative projects, at least, in decentralized economy composed of dynamic SMEs. In this respect, large hierarchical banks are not necessarily the best option in the sense that they have low ability to collect local knowledge.

Finally, according to the "williamsonian" paradigm, transaction costs decrease (especially through information and communications technologies) might diminish firms' average size and allocate an increasing part of the production to specialized SMEs. Furthermore, introducing congestion costs into models of economics geography, Krugman & Venables (1995) designed a theoretical path for sectorial diversification as empirically showed by Imbs & Wacziarg (2003). Therefore, sectors diversification and firms' decentralization should enhance the number of innovative SMEs in the future. The way those firms will improve their productivity and reduce their costs turns out to be central issue. Because small and medium size firms do not produce huge quantitative information, the lending process needs specific knowledge. As a consequence, local bank activities might perform new solutions in the future and preserve us from "too big to fail" issues at the same time.

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