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What do we know about the role of bank competition in Africa?

Florian Léon

Etudes et Documents n° 16

Juin 2015

To cite this document:

Léon F. (2015) "What do we know about the role of bank competition in Africa?", *Etudes et Documents*, n° 16, CERDI. http://cerdi.org/production/show/id/1695/type_production_id/1

CERDI
65 BD. F. MITTERRAND
63000 CLERMONT FERRAND – FRANCE
TEL. + 33 4 73 17 74 00
FAX + 33 4 73 17 74 28
www.cerdi.org

The authors

Florian Léon

Associate Researcher

Clermont Université, Université d'Auvergne, CNRS, UMR 6587, CERDI, F-63009 Clermont Fd

Email : florian.leon@gmail.com

Corresponding author: Florian Léon



This work was supported by the LABEX IDGM+ (ANR-10-LABX-14-01) within the program “Investissements d’Avenir” operated by the French National Research Agency (ANR)

Etudes et Documents are available online at: <http://www.cerdi.org/ed>

Director of Publication: Vianney Dequiedt
Editor: Catherine Araujo Bonjean
Publisher: Chantal Brige-Ukpong
ISSN: 2114 - 7957

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Abstract

This paper reviews the literature regarding the consequences of interbank competition. The literature has identified three reasons why competition in the financial sector is important: firstly, for efficient functioning of financial intermediaries and markets, secondly, for firms and households access to financial services and thirdly, for stability of the financial system. While special attention is dedicated to empirical papers focusing on African banking systems, this review also considers works on other developing and developed economies.

Key words: Bank competition, bank efficiency, access to credit, financial stability, Africa

JEL codes: D40, G21, O55

1 Introduction

In response to state interventions in finance and to their potential negative consequences on competition, some authors point out the importance of competition in the banking sector in promoting efficiency and financial inclusion without necessarily undermining financial stability ([Beck et al., 2011](#); [World Bank, 2013](#)).

The conventional view suggests that market power is detrimental in banking as well as in other industries. By lowering financial intermediation costs, increasing loan quantities, and extending the ranges of financial services available, more competitive banking systems enhance financial intermediation. However, due to particularities of the banking industry, the impact of market power is more ambiguous in banking than in other sectors. Limited competition can help to provide incentives to acquire information on borrowers or to stabilize the financial system.

This paper reviews the literature regarding the consequences of interbank competition. The literature has identified three reasons why competition in the financial sector is important: firstly, for efficient functioning of financial intermediaries and markets, secondly, for firms and households access to financial services and thirdly, for stability of the financial system.¹ Section 2 analyzes the literature regarding the relationship between competition and efficiency. The consequences of competition on credit availability are reviewed in Section 3 and Section 4 presents the competition - stability debate. Special attention is dedicated to empirical papers that focus on African banking systems. Indeed, the competition issue is reinforced in Africa by recent trends. The expansion of African cross-border banking groups has brought on some transformations in African banking industries that have had repercussions in terms of competition.

¹Recent papers investigate the implication of competition on monetary policy transmission in industrialized countries ([Van Leuvensteijn et al., 2013](#)). Another intense debate in industrial organization literature beyond banking concerns the relationship between competition and innovation. The question is complex and results are inconclusive ([Aghion et al., 2005](#); [Zarutskie, 2013](#)).

2 Competition and banking efficiency

2.1 Testing the SCP hypothesis

Initial studies on the relationship between competition and efficiency originated from the *Structure-Conduct-Paradigm* (SCP paradigm). The *SCP* paradigm (Mason, 1939; Bain, 1956) states that higher concentration in the market causes less competitive bank conduct (higher interest rates, lower supply of funds) and hence higher profits. The first empirical contributions regarding the industrial organization of the banking industry were developed to give empirical support for the *SCP* hypothesis in the U.S (Gilbert, 1984; Berger and Hannan, 1989; Hannan, 1991; Gilbert and Zaretsky, 2003). These primary studies often documented that banks outperform their counterparts in concentrated markets. However, the positive correlation between profitability and market concentration can be explained by reverse causation. According to the "efficient structure" (ES) hypothesis (Demsetz, 1973; Peltzman, 1977), better managed, more efficient firms can secure the largest market shares, leading to higher concentration and more market power. Berger (1995) attempted to distinguish between both explanations. He argued that after controlling for bank efficiency, market share captures the relative market power of banks.² His results did not provide support for the *SCP* hypothesis. Some works have used the same methodology to test the *SCP* hypothesis in industrialized countries with mixed conclusions (see: Gilbert and Zaretsky, 2003; Degryse et al., 2009).

Empirical tests of the *SCP* paradigm in the case of developing countries are scarce and findings have been largely inconclusive. Demirgüç-Kunt and Huizinga (1999) study the relationship between profitability and the share of assets controlled by the three largest banks in a sample of 80 countries, including both developed and developing countries. Results give weak support for the *SCP* paradigm. Using a sample of 55 developing countries and the Lerner index as a proxy of market power, Amidu (2011) finds a positive relationship between market power and profitability. As such, the author confirms the relationship from conduct to performance but not from structure to performance. Flamini et al. (2009) fail to provide support for the *SCP* hypothesis in the case of 41 African

²Concentration and market share were also regressed against the efficiency variables to test the necessary condition of the ES hypotheses, namely that efficiency affects market structure.

banking systems. [Okeahalam \(1998, 2002a,b\)](#) gives support for the *SCP* hypothesis in a subset of Southern African economies. [Chirwa \(2003\)](#) reaches a similar conclusion in Malawi, while evidence from Uganda, Nigeria, and Kenya does not support the *SCP* hypothesis (cf. Table 1).

A fast-growing body of literature has investigated the determinants of margins or interest spreads ([Berger et al., 2004](#)). Channeling funds from lenders to borrowers remains the primary activity of banks, especially in developing areas. As a result, intermediation costs is an alternative measure of bank performance more closely related to consumer welfare losses and bank conduct. The findings regarding the role played by the structure of the banking market on intermediation costs in cross-country studies are inconclusive (cf. Table 2: Panel A).³ [Crowley \(2007\)](#) documents some stylized facts on the determinants of margins in 18 English-speaking African countries. He highlights that bank concentration is unrelated to the level of margins. In a more robust analysis, [Ahokpessi \(2013\)](#) shows that bank concentration is negatively correlated to margins in Africa but the coefficient turns positive when interaction with operating costs is included. In addition to these papers, some articles have analyzed the determinants of margins or spreads in individual African countries. Results provide a mixed picture. Margins and spreads appear positively correlated with the market concentration in Malawi and Ghana, but not in Kenya. Results for the Ugandan banking system differ among studies (cf. Table 2: Panel C).

All of these studies suffer from one major shortcoming: concentration measures are not good predictors of competition. The new empirical industrial organization literature provides measures of competition based on firm behavior such as the Lerner index, the Panzar-Rosse H-statistic or the Boone indicator (see Appendix A).⁴ Using the Panzar-Rosse H-statistic to proxy competition, [Gelos \(2009\)](#) points out the absence of effect of competition on interest margins in the case of 60 countries. [Amidu and Wolfe \(2012\)](#)

³Owing to the high spreads in Latin America, several works have focused their attention on this area ([Barajas et al., 2000](#); [Brock and Rojas-Suarez, 2000](#); [Martinez Peria and Mody, 2004](#), among others) with mixed results regarding the implications of market power.

⁴For a complete review of each method, see [Léon \(2014b\)](#).

shed light on the positive relationship between the Lerner index and margins for 55 developing countries. [Aboagye et al. \(2008\)](#) adopt the same method in their investigation of determinants of margins in Ghana and reach the same conclusion. Contrary to other measures of competition, the Lerner index has the advantage of being firm-specific. This is particularly useful when the level of analysis is at the bank level and not at the market level. However, one might be concerned about the fact of regressing margins on margins.⁵ Indeed, the Lerner index is a price to (marginal) cost margin ([Carbó-Valverde and Rodríguez Fernández, 2007](#)). Accountability margins (such as net interest margins or spreads) and price-cost margins are strongly related, particularly in countries where revenues diversification is limited. As a result, the positive coefficient is not only expected but also misleading.⁶

To summarize neither study investigating the determinants of margins nor works testing the *SCP* paradigm can reach a clear conclusion about the implications of competition (and market power) on bank behavior. While some papers give support to the *SCP* view, other works find the opposite results or an absence of impact. In addition, many papers suffer from certain limitations. Analyzing the determinants of margins (or profits) require bank-level measures of market power to get precise estimations. However, the natural candidate, namely the Lerner index, is subject to endogeneity problems. Indeed, the Lerner index captures price-cost margin that is closely related to interest margin or profits. Future works should provide innovative bank-level indicators of market power that are not strongly correlated with margins to revisit the relationship between market power and intermediation costs. In this way, [Léon \(2015b\)](#) proposes an alternative indicator of competition. His measure, called the local market power index, is based on the concentration of banks in local markets (cities). His results tend to support the market power view in the case of seven West African countries.

⁵[Maudos and Fernández de Guevara \(2004\)](#) and [Maudos and Solis \(2009\)](#) have used the same procedure in the case of European countries and Mexico, respectively.

⁶The same argument may apply for studies regressing the Lerner index on profit, which can be considered as a form of margin ([Carbó-Valverde et al., 2009a](#)).

2.2 Testing the Quiet Life hypothesis

The *SCP* paradigm asserts that banks in less competitive markets are more profitable because borrowers pay higher loan rates and depositors receive lower deposit rates. In the context of the literature that analyzes the relationship between competition and efficiency, other papers have focused on the implication of competition on the internal organization of banks.

The *Quiet Life hypothesis* documents that efficiency is lower in noncompetitive markets because of slack management (Hicks, 1935). Managers can relax their efforts in less competitive markets. Market power, by blurring the signals, may allow managerial incompetence or non-profit maximization behaviors not to be detected by the owners (principal) and thus to persist. On the contrary, assessing the performance of the banks relative to other banks is less complex in competitive markets. A small deviation from profit maximization is more rapidly detected in competitive markets (for more details, see Berger and Hannan, 1998).

There are alternative explanations advocating for the rejection of this hypothesis in the specific case of the banking industry. Banks with market power can enjoy lower costs of screening and monitoring borrowers (see below). In addition, market power allows banks to benefit from greater profits, which may create incentives to behave prudently, this behavior leading to the selection of less risky activities with lower monitoring costs. Finally, banks with market power are under less pressure to increase the quality of banking services, which consequently decreases the operating costs.

In a widely cited paper, Berger and Hannan (1998) tested the *Quiet Life hypothesis* using U.S. data from the 1980s. They found evidence that banks in more concentrated markets exhibits poorer cost efficiency than other banks.⁷ However, some papers raise doubts about the structural approach to proxy competition (see Appendix A). As a result, this issue has been reinvestigated using the Lerner index as proxy of market power. Some

⁷Several works assess cost efficiency using accounting data such as overhead expenses to total assets (Demirgüç-Kunt et al., 2004; Barth et al., 2004). Nonetheless, the majority of studies compute (cost and profit) efficiency score using frontier methods (stochastic frontier analysis or data envelopment analysis). These methods have the major advantage of getting a more accurate measure of firm performance.

papers have explored the relationship between market power and efficiency in banking in developed countries, with mixed results. Findings from developing countries are also ambiguous (Maudos and Solis, 2009; Turk Ariss, 2010; Williams, 2012; Fungáčová et al., 2013).

The relationship between market power and efficiency might be specific in low-income countries from Africa, and elsewhere, due to high degree of opacity and agency problems. To my knowledge, however, a handful of paper has analyzed the impact of market power on efficiency in Africa (and in the case of low-income countries from elsewhere). An initial strand of works investigated the evolution of competition and efficiency over time (Hauner and Peiris, 2008; Mwege, 2011) but did not analyze the direct relationship between market power and efficiency. On the other hand, some studies on the determinants of efficiency in Sub-Saharan Africa include a measure of bank concentration (Ndiaye, 2008; Kirkpatrick et al., 2008; Kablan, 2010, 2009). Chen (2009) and Zhao and Murinde (2011) include non-structural measures of competition in the determinants of bank efficiency in Africa.⁸ Both studies give support for the *Quiet Life hypothesis* but both studies suffer from two drawbacks. On the one hand, they assume that the level of bank competition is exogenous in contradiction to the *efficient structure hypothesis*. On the other hand, both works employ market-based measures of competition and thus implicitly assume that all banks have the same degree of market power. In line with the most recent studies, Léon (2014a) computed the Lerner index to test the Quiet Life hypothesis in a sample of 92 banks in seven West African economies. The Lerner index has the advantage to be bank-specific and he controls for endogeneity due to reverse causation. The results tend to reject the Quiet Life hypothesis.

As a result, the literature examining the link between market power/competition and efficiency is somewhat limited on Africa and findings do not provide a clear conclusion.

⁸Chen (2009) investigates the determinants of efficiency in a sample of 77 banks from 10 middle-income countries (Angola, Botswana, Cameroon, Cape Verde, Rep. of Congo, Eq. Guinea, Gabon, Lesotho, Mauritius, Namibia, Seychelles, South Africa and Swaziland). The level of competition is assessed by the H-statistic. Zhao and Murinde (2011) analyze the determinants of bank efficiency in a sample of 91 Nigerian banks and an elasticity-adjusted Lerner index (conjectural variation method) is used to proxy competition.

Indeed some works support the view that competition is beneficial for efficiency (Chen, 2009; Zhao and Murinde, 2011), while other papers find the opposite (Léon, 2014a). Future works should test the *Quiet Life hypothesis* in the context of opaque credit markets. In addition, it should be instructive to test the channels whereby market power might positively (or negatively) affect efficiency.

3 Competition and access to finance

Access to finance is another area in which the implication of competition is discussed. The conventional view arguing that competition is always beneficial has been challenged since the mid-1990s. The *Information hypothesis* posits that in the presence of information asymmetries and agency costs, competition reduces access by making it more difficult for banks to internalize the returns from investing in lending, in particular, with opaque clients. Theory makes ambiguous predictions regarding the effect of competition on access to finance.

3.1 Theoretical literature

3.1.1 Market power hypothesis

The conventional view suggests that market power is detrimental in banking as well as in other industries. The *Structure-Conduct-Performance* paradigm, as well as the Monti-Klein model (Klein, 1971; Monti, 1972), states that higher concentration in the market increases interest rates and reduces the supply of funds. Besanko and Thakor (1992) examine loan and deposit markets in a theoretical model where banks can differentiate themselves from competitors. The model shows that equilibrium loan rates decline and deposit interest rates increase after removing entry barriers, even when allowing for differentiated competition. Guzman (2000) confirms the negative effect of market power in a general equilibrium model of capital accumulation. He compares the effect of capital accumulation of an economy that has a monopoly banking system versus one that has a competitive system. He shows that a banking monopoly is more likely to result in credit

rationing and leads to a lower capital accumulation rate.⁹

Barth et al. (2009) propose an indirect channel whereby competition may be beneficial for access to finance. They note that corruption in lending undermines a bank's function of allocating scarce capital efficiently. In a simple bargaining model, they show that higher concentration (less competition) in the banking sector is associated with more bank-lending corruption. Extending the argument, decisions on funds allocation are more often made on the basis of project return than on non-economic considerations (corruption, personal ties or networks) in competitive credit markets. Finally, Hainz et al. (2008) point out another channel whereby competition can alleviate credit constraints for small firms. Banks can solve the resulting adverse selection problem either by screening or by asking for collateral. The need for collateral in loan contracts is more likely when competition is limited.¹⁰ Insofar as small enterprises have limited tangible assets, increasing competition can improve the access to credit for these firms.

3.1.2 Information hypothesis

The *Information hypothesis* sheds light on one specificity of credit markets, namely the informational asymmetry between lenders and borrowers.¹¹ The asymmetries of information induce the risk of adverse selection and moral hazard and therefore credit rationing

⁹Three different situations may occur in which monopoly power in banking is detrimental. First, a monopoly banking system will ration credit under conditions where a competitive system would not. If the conditions imply rationing in both systems, quantities are more rationed by a monopolistic bank than within a competitive setting. Finally, without credit rationing, monopoly power is still inefficient because a monopoly bank will charge a higher interest rate on loans (owing to excessive monitoring).

¹⁰The intuition is the following. Firms located close to a bank are financed through a screening contract. Indeed, due to limited (physical and therefore informational) distance between the firm and the bank, the bank can obtain a perfect signal on creditworthiness with a limited cost. As a result, a contract based on screening is less costly for the firm. By contrast, for firms located away from the bank, a collateralized contract is more profitable. When the number of banks increases, it becomes more profitable for many firms that initially used a collateralized contract to adopt a screening contract. They provide empirical evidence on 70 developing countries that supports their intuition.

¹¹The Information hypothesis groups together heterogeneous papers that draw special attention to specificities of the banking industry, especially the importance of information. This strand of literature is sometimes named differently in the literature.

(Stiglitz and Weiss, 1981). Since the 1990s, researchers have begun to examine how banks might mitigate information problems in opaque firms lending. Lenders might get accurate information on borrowers' characteristics through *ex-ante* screening and/or *ex-post* monitoring activities. The *Information hypothesis* argues that market power may alleviate the information wedge between lenders and borrowers by impacting both screening and monitoring activities.

Competition and relationship lending:

Petersen and Rajan (1995) acknowledge that banks will be less reluctant to finance riskier ventures if competition is limited. They may accommodate an intertemporal smoothing of contract terms, including losses for the bank in the short term that are recouped later in the relationship. The bank relies on the fact that the successful firms will not be bid away by rivals in the future. By contrast, in a competitive setting, a bank sustaining the initial cost of offering credit at a lower rate can not retain its successful customers. Petersen and Rajan (1995) underline that bank competition may be inimical to the formation of relationships between firms and lenders. This idea was already advanced by Mayer (1988). Relationship lending (or relationship banking) is one of the most powerful technologies available to reduce information problems in opaque firm finance that have little credit history or collateral (tangible assets).¹² Alongside its effect on intertemporal smoothing of contract terms, relationship lending is expected to relax financing constraints in several other ways (for more details, see Boot, 2000; Eber, 2001).¹³ Strong relationships between

¹²According to Berger and Udell (2006), a lending technology can be defined as "a combination of a primary information source, screening and underwriting procedures, loan contract structure, and monitoring mechanisms". Lending technologies are often categorized into two types: transaction lending ("arm's length" lending) that is based on quantitative "hard" information and relationship lending, which is based on qualitative "soft" information (Rajan, 1992; Stein, 2002; Petersen, 2004). Relationship lending implies two elements: acquisition of confidential information (proprietary) and multiple interactions with the same customer over time and/or across products (Boot, 2000).

¹³While the lending relationship is expected to alleviate financial constraints, this technology has less clear-cut implications in terms of interest rates. Close ties between bank and firm reduce both verification costs and risk-premiums and should thus decrease the interest rates charged by banks. However, Sharpe (1990), Fisher (1990), and Rajan (1992) point out that lending banks possess ex post information

firm and lender allow for monitoring the firms during the course of lending. Not only is the lender willing to engage more resources in the acquisition of information, but the borrower might also be more inclined to reveal strategic information exclusively to its bank rather than to disseminate it to financial markets that would benefit its competitors (Bhattacharya and Chiesa, 1995; Yosha, 1995). In addition, a privileged link between a bank and a firm allows the firm to be partly protected from adverse business conditions (Berlin and Mester, 1999). A third way whereby the lending relationship may relax financing constraints is through better control of managers. Relationship lending might reduce the moral hazard issue through the threat of termination (Stiglitz and Weiss, 1983; Bolton and Scharfstein, 1990) and the reputation effect (Boot and Thakor, 1994).¹⁴ Therefore, the *information hypothesis* argues that competition can be detrimental to credit availability through its negative impact on relationship lending.

A fast-growing body of theoretical literature has analyzed the relationship between relationship lending and competition.¹⁵ The "strategic theory of relationship lending" challenges the *information hypothesis*. Private information may constrain competition in the refinancing stage (Sharpe, 1990; Fisher, 1990; Rajan, 1992) and serve to constrain entry into the industry (Dell'Ariccia et al., 1999; Dell'Ariccia, 2001; Marquez, 2002). Relationship lending may be used strategically as a competitive device, when banks and the products they offer are not homogenous. In this light, relationships emerge as a prime source of an incumbent bank's comparative advantage over *de novo* lenders. Boot and

monopoly. As a result, this information asymmetry allows banks to capture some of the rents generated by their customers through higher interest rates. Switching is not a credible threat insofar as a borrower can lose its reputation and be unable to obtain lower interest rates from outside banks. As a consequence, theory cannot provide an unambiguous conclusion on the impact of relationship lending on rates.

¹⁴However, it should be noted that the threat of denial of additional loans is not a credible commitment. Due to the soft-budget constraint problem, lending relationships might exert a perverse ex ante incentive on firms' behavior (Dewatripont and Maskin, 1995; Bolton and Scharfstein, 1996).

¹⁵Berger and Udell (2006) argue that this characterization is flawed. There exist a number of distinct transaction technologies used by banks, including financial statement lending, small business credit scoring, asset-based lending, factoring, fixed-asset lending, and leasing. While financial statement lending is well-fitted for transparent borrowers, other transaction technologies are all targeted to opaque borrowers. De La Torre et al. (2010) show that banks offer a wide range of products and services on SMEs, through the use of new technologies, business models and risk managements systems.

Thakor (2000) argue that a more competitive environment may encourage banks to become more client-driven and to customize services, thus focusing more on relationship banking. Yafeh and Yosha (2001) suggest that facilitating entry (increased competition) in the arm's length market may strengthen bank-firm relationships. Dell'Ariccia and Marquez (2004) find that greater competition from out-of-market banks generates an increase in relationship lending by local banks. On the other hand, Dinc (2000) shows that there is an inverted U-shaped relationship between the amount of relationship lending and the number of banks. As a result, the theoretical literature on the effects of interbank competition on bank orientation, and thus access to credit, is somewhat inconclusive. Some studies empirically investigate the effect of competition on bank orientation without solving the puzzle. Papers find evidence for negative effects (Petersen and Rajan, 1995; Fischer, 2000), positive effects (Kysucky and Norden, 2015) or U-shaped effects of competition on relationship lending (Elsas, 2005; Degryse and Ongena, 2007; Presbitero and Zazzaro, 2011). One should note that a similar argument can apply to studying the incentives for banks to develop new products or open new branches in remote areas (see Appendix B). A dominant position may allow the provider to reach scale economies. On the other hand, competitive pressure may give a bank incentive to stand out from its competitors.

Competition and screening activity:

The *information hypothesis* points out another possible shortcoming associated with bank competition. Banks may actively produce *ex-ante* information by screening projects. Banks use (imperfect) creditworthiness tests which allow them to discriminate between worthy and unprofitable projects. Screening takes place in both arm's length lending and relationship lending. Contributions have investigated how competition affects the quality of screening activities and banks' incentives to invest in screening.

Increasing the number of banks in the credit market may blur the signal that banks receive on firms' quality (Broecker, 1990; Cao and Shi, 2001). Rejected applicants (either of high or low quality) can continue to apply to other banks; the more banks there are in the market, the more chances the worst applicants have of being mistaken for a good risk.

Increasing the number of banks performing screening tests decreases the average credit-worthiness of firms, and increases the probability that a bank will not grant a loan. This phenomenon is known as the "winner's curse" problem. [Marquez \(2002\)](#) shows that with more competing banks, each bank becomes informed about a smaller pool of borrowers, resulting in less efficient borrower screening. As a result, due to less efficient screening, banks become more conservative and the efficiency of allocation decreases, while interest rates increase when competition is fiercer.

Competition plays a role not only on the quality of screening, but also on banks' incentives to invest in screening technologies. Previous contributions assume that credit-worthiness tests are imperfect filters between worthy and unprofitable projects but their precision can be adjusted by the investment of resources. [Gehrig \(1998\)](#) investigates the incentives of banks to produce information by allowing them to choose the level of their screening effort. Banks like to invest in costly screening activities for two reasons. More precise screening reduces credit risk and therefore the cost of lending and increases the approval of profitable projects since less of them are erroneously rejected. Competition exerts an ambiguous impact on investment in screening. A compression of lending margins reduces screening incentives if, and only if, the value of identifying good projects exceeds that of rejecting bad ones. In other words, in economies where banks are mainly concerned with avoiding bad projects, harsher competition may improve screening incentives. According to [Gehrig \(1998\)](#), this scenario is particularly relevant for developing countries. In a different setting, [Dell'Ariccia \(2000\)](#) also documents an ambiguous relationship between market structure and screening incentives. The net effect varies depending on which of the following two opposite effects prevails. On the one hand, fiercer competition aggravates the adverse selection problem that banks face, causing them to invest more in screening. On the other hand, more competition corresponds to a stronger temptation to deviate from a screening equilibrium and consequently increases the incentive to stop screening applicant borrowers.

None of these models take into account the fact that acquisition of information may be a strategic tool. Banks can use proprietary information in order to soften lending competition from outside banks. Uninformed banks cannot really compete with a lender that possesses private information. [Hauswald and Marquez \(2006\)](#) take into account the

strategic role of information acquisition. They point out that increased competition reduces intermediaries' rents and decreases their overall incentives to generate information. This result is in line with previous models that study the relationship between competition and screening incentives (Villas-Boas and Schmidt-Mohr, 1999; Manove et al., 2001).

3.2 Empirical literature

Theoretical literature is somewhat inconclusive regarding the impact of competition on access to finance. One might expect that the empirical literature would provide some insights on this debate. The empirical literature regarding the consequences of bank competition on credit availability has made some progress over the past decade. Contrary to literature on the consequences of bank competition on efficiency, identifying credit constraints and thus studying the implications of competition on credit availability requires having information on non-financial firms (see Appendix C). Unfortunately, firm-level data on Africa is often too scarce to provide robust econometric works. As a result, no study has directly investigated this question on Africa. In this section, I thus review the studies on developing countries as well as indirect evidence from Africa.

3.2.1 Competition and dynamics of real sectors

In line with the debate on the impact of bank competition on credit availability, some papers have studied the role of competition on the dynamics of non-financial industries (entry and life duration of new firms, growth or structure of non-financial industries). Studies including developing countries provide mixed results regarding the impact of competition on real activity (see Table 3).¹⁶

Cetorelli and Gambera (2001) (CG) extend the model of Rajan and Zingales (1998) by introducing bank market concentration as an explanatory variable of growth for 36

¹⁶Evidence of effects of interbank competition on real activity in developed countries is also mixed. Some papers support the market power view (Jayaratne and Strahan, 1996; Black and Strahan, 2002; Cetorelli, 2004; Cetorelli and Strahan, 2006; Bertrand et al., 2007), while others give support for the information hypothesis (Jackson and Thomas, 1995; Bonaccorsi di Patti and Dell'Araccia, 2003; Fernández de Guevara and Maudos, 2009).

industries in 41 countries.¹⁷ The findings suggest a non-trivial impact of bank concentration on industrial growth. Banking sector concentration exerts a depressing effect on overall economic growth even as it promotes the growth of industries that depend heavily on external finance. [Deidda and Fattouh \(2005\)](#) use the same methodology and data but divide the sample into two groups of countries: low-income and high-income countries. They find that banking concentration is negatively associated with industrial growth only in the sub-sample of low-income countries. There is no significant relationship between banking concentration and growth in high-income countries. [Fernández et al. \(2010\)](#), however, find opposite results. They analyze the effect of bank concentration on economic growth for 84 countries. Results indicate that bank concentration has a negative effect on economic growth, an effect that disappears in countries with poorer quality institutional environments.¹⁸

Given the limitations of the concentration measures to proxy competition (see Appendix A), some papers have assessed the level of competition by non-structural measures. In spite of the use of the same methodology (the CG’s method), these papers do not provide the same conclusions (see Table 3). While some articles give support for the *market power hypothesis* ([Claessens and Laeven, 2005](#); [Liu and Mirzaei, 2013](#)), other papers are in line with the *information hypothesis* ([Fernández de Guevara and Maudos, 2011](#); [Hoxha, 2013](#)).

3.2.2 Competition and credit availability

Since the mid-2000s, in the footsteps of [Petersen and Rajan \(1995\)](#), some works have scrutinized the direct effects of competition on the availability of bank credit to firms

¹⁷[Rajan and Zingales \(1998\)](#) assume that industries that are more dependent on external financing will have relatively higher growth rates in countries that have more developed financial markets. To test this hypothesis, they regress an index of external financial dependence of industry j interacted with financial development on growth of value added in sector j . The industry’s dependence on external finance is extracted from U.S. data (the U.S. market is assumed to be the market in which financial constraints are the lowest).

¹⁸This finding is in line with the theoretical framework developed by [Cetorelli and Peretto \(2012\)](#) which states that in economies where market uncertainty is high, less competition leads to higher capital accumulation.

in developing economies and have found mixed results.¹⁹ Using data on 74 countries, Beck et al. (2004) show that bank concentration increases the probability that a firm perceives finance as a major obstacle to its growth. Clarke et al. (2006) suggest that foreign bank penetration (increasing competition) reduces the perception of finance as an obstacle in 38 emerging countries, confirming the *market power view*. Measures extracted from firms' perception are open to criticism (see Appendix C). Other research assesses the need for external funds by using a mix of external and internal funds or the sensitivity of investment on cash-flow. González and González (2008) give support for the *Information hypothesis view*, while the results from Lin et al. (2010) are in line with the *Market Power hypothesis*.

Carbó-Valverde et al. (2009b) document that the results are sensitive to the choice between structural and non-structural measures of competition. Exploiting a dataset on SMEs in Spain, the authors find evidence that competition (a lower Lerner value) promotes access to finance, despite the fact that firms face fewer constraints in concentrated markets. Using data for 33 countries, Mudd (2013) points out that the relationship between competition and access to credit is more complex. He documents that competition (assessed by Panzar-Rosse H-value) has a positive but declining effect on firm use of bank loans which turns to a negative impact for competitive markets above the mean. Using a sample of 53 developing countries, Love and Martinez Peria (2015) give support for the *market power hypothesis*. They find that the probability of a firm having a line of credit is reduced in countries where market power is higher (measured by Lerner index and Boone indicator). León (2015a) reach similar conclusion using a different measure of credit availability, a large sample of countries, and different measures of competition.

¹⁹The empirical evidence related to the effect of bank competition on small firm credit availability is mixed in industrialized countries. Some cases find concentration associated with improved small firm credit availability (Petersen and Rajan, 1995; Fischer, 2000) or to have no effect (Jayaratne and Wolken, 1999; Berger, 2007). Zarutskie (2006) documents that newly formed firms have significantly less outside debt on their balance sheets following deregulation. Rice and Strahan (2010) find that in states more open to branching, small firms are more likely to borrow and do so at lower rates. However, the authors find that there no effects on the amount that small firms can borrow. Scott and Dunkelberg (2010) shows a significant positive association between changes in bank competition reported by small firms and their reports of changes in quality of services provided by banks.

He considers the consequences of bank competition on credit constraints using firm level data covering 69 developing countries. Firms are classified as financially constrained if their loan application was rejected or if they refused to apply due to market frictions (see Appendix C). Competition is assessed by computing three non-structural measures (Boone indicator, Lerner index and H-statistic). The results show that financing constraints are alleviated in countries where banking markets are more competitive. The empirical set-up allows us not only to test the *information hypothesis* against the *market power hypothesis* but also to investigate the channels by which competition affects credit availability. The results show that competition not only leads to less severe loan approval decisions but that it also reduces borrower discouragement.

3.2.3 Indirect evidence in the case of Africa

Only a handful of papers have given special attention to Africa. [Kpodar \(2005\)](#) gives support for the *market power view*. He documents that the weak relationship between finance and growth in Africa is partially due to concentration in the banking industries. Two other studies investigate the consequences of financial liberalization in Africa and are more consistent with the *Information hypothesis*. [O'Toole \(2012\)](#) documents that financial liberalization does not alleviate financing constraints in Africa. [Kabango and Paloni \(2011\)](#) find that financial liberalization in Malawi resulted in an increase in industrial concentration and a decrease of net firm entry, especially in sectors that are more dependent to finance. However, concentration and liberalization are different than competition. Liberalization policies do not necessarily increase competition ([Delis, 2012](#)) and banks may behave competitively in concentrated markets ([Baumol et al., 1982](#)). In addition, these studies do not directly investigate the impact on access to credit but rather analyze the implications of competition on real sector activity.

To summarize, while the relationship between bank competition and credit availability has been largely investigated in industrialized countries, few papers study it in the case of African countries. Recent papers give support for the *market power hypothesis* ([Love and Martinez Peria, 2015](#); [Léon, 2015b](#)). Unfortunately the existing researches often exclude many low-income countries, especially from Africa, due to the lack of data. Some indirect

evidence has been provided in the case of African economies but conclusions are mixed. Future research should specifically study the implications of competition on credit access in low-income countries from Africa and elsewhere.

4 Competition and financial stability

There is a hot debate in the banking literature regarding the effect of competition on overall financial stability. Interest on this subject intensified during the recent global financial crisis, as many questioned whether high competition in developed and emerging countries was partly to blame. Theoretical and empirical studies have not come to a conclusive finding on the relationship between competition and stability. The *competition-fragility view* posits that more competition among banks leads to more fragility, while the proponents of the *competition-stability view* argue that instability is more likely in less competitive markets.

4.1 Theoretical literature

4.1.1 Competition-fragility view

Under the *competition-fragility view*, restrained competition should encourage banks to protect their higher franchise values by pursuing safer policies that contribute to the stability of the entire banking system (Marcus, 1984; Keeley, 1990; Hellmann et al., 2000, among others).²⁰ A bank with more market power enjoys higher profits and has more to lose if it takes on more risk. Cordella and Yeyati (2002) show that increased competition reduces differentiation and margins. This may not only provide an incentive to take more risk (*Charter Value hypothesis*) but may also render banks more vulnerable to shocks. Higher profits allow banks to maintain higher levels of capital ("buffer") that protect them from external shocks and diversification is a way to cope with idiosyncratic risk. Another channel through which competition can impact stability is its detrimental effect on the incentives and effectiveness of screening activity (Broecker, 1990; Hauswald and Marquez,

²⁰For in-depth discussions about the theoretical linkages between competition and stability in banking, see Allen and Gale (2004) and Carletti (2008).

2006). This aggravates the information problem that banks face, thus increasing the risk of defaults. Competition can also destabilize the banking sector through its impact on the interbank market and the payments system. [Allen and Gale \(2000\)](#) show that banks do not have incentives to provide liquidity to a troubled bank when the interbank market is competitive, because each of them acts as price taker and assumes that its action does not affect the equilibrium.

4.1.2 Competition-stability view

The proponents of the *competition-stability view* argue that less competition is detrimental for financial stability. A common assumption of the models based on the charter value is that banks have complete control over the risk of their portfolios. Existing theory ignores the potential impact of market power on borrowers' behavior. [Boyd and De Nicolo \(2005\)](#) investigate the implications of competition on loan markets and borrowers' behavior. Greater competition in the loan market reduces the interest rates that entrepreneurs pay. These lower interest rates may induce firms to assume lower risk due to higher profits, which results in a lower probability that loans turn non-performing. [Martinez-Miera and Repullo \(2010\)](#) extend the Boyd and De Nicolo's (BDN) model. As in the BDN model, the "risk shifting" effect captures the result that more competition leads to lower loan rates, lower firm default probabilities and improved bank stability. However, lower rates also reduce interest payments and thus overall bank revenues, which can lead to potentially greater bank risk and bank failures. This effect is defined as the "margin" effect. A U-shaped relationship between the number of banks and the risk of bank failure is found to represent the net effect of these two forces. The "risk-shifting" effect is shown to dominate in very concentrated markets, such that increased entry improves bank risk measures. In already competitive markets, the margin effect dominates such that further entry worsens bank risk.²¹ Other arguments focus on indirect effects of bank competition. Banks in less competitive environments are often more likely to be inefficiently managed

²¹[Caminal and Matutes \(2002\)](#) propose another model based on the entrepreneurial moral hazard problem. They consider that banks have two ways to deal with moral hazard: monitoring and rationing. They show that less competition can lead to less credit rationing (more monitoring), larger loans and higher probability of failure.

and more likely to fail (Schaeck and Cihák, 2013).²² Furthermore, Allen et al. (2011) show that competition may motivate banks to hold higher levels of capital because this indicates a commitment to monitoring and attracts creditworthy borrowers.²³

4.2 Empirical literature

Numerous empirical papers have used different samples, risk measures and competition proxies to discriminate between the competition-fragility and competition-stability views.²⁴

4.2.1 Competition and financial system stability

The first strand of studies analyzes the impact of bank competition on financial stability. Bank stability is often measured by systemic banking distress, defined as periods where the banking system is not capable of fulfilling its functions. Papers often use the occurrence of a banking crisis to define such events (Demirgüç-Kunt and Detragiache, 1997; Laeven and Valencia, 2012). The majority of works are in line with the *competition-stability view*. One exception is the work of Beck et al. (2006). They investigate the impact of bank concentration on the likelihood of a systemic banking crisis on a sample of 69 countries. They show that crises are less likely in economies with more concentrated banking systems. Considering 91 countries, however, Boyd et al. (2010) document that

²²The same argument may apply in concentrated markets if larger banks are more likely to receive public guarantees (Mishkin, 1999).

²³Closely linked to the market structure and fragility debate is the issue of bank size. Larger banks can better diversify their portfolios. Furthermore larger banks may be easier to supervise. Hence, supervision of banks may be more effective and the risk of a system-wide contagion should presumably recede (Allen and Gale, 2000). Financial fragility is therefore reduced in more concentrated markets. Advocates of the competition-stability view disagree with the notion that concentrated banking systems are more stable. More concentrated markets with larger banks can be more complex and hence harder to supervise. Furthermore, larger banks can take more risks because the "too big to fail" principle protects them against failure.

²⁴Only a handful of cross-sectional studies regarding the competition-stability nexus are presented. Readers may refer to Beck (2008) or Jiménez et al. (2013) for additional references on country specific studies.

sharp decreases in loan growth are more likely to occur in less diluted markets.²⁵ [Schaeck et al. \(2009\)](#) investigate the relationship between occurrence and duration of financial crises and competition for 45 countries. Competition is assessed by the Panzar-Rosse H-statistic. The authors document that crises are more likely to occur and for longer periods in less competitive banking markets, in line with the *competition-stability view*. In a recent paper, [Anginer et al. \(2012\)](#) introduce a new measure of systemic risk. Systemic risk is measured as the codependence in default probability across banks. They find that lower market power (as measured by the Lerner index) encourages banks to diversify risk rendering the banking system less fragile to shocks. They also show that lack of competition has a more adverse effect in countries with low levels of foreign ownership, weak investor protection, generous safety nets and weak regulation and supervision.

4.2.2 Competition and individual bank soundness

Rather than focusing on systemic bank distress, numerous studies use bank-level data to calculate individual bank soundness. The most widely used proxy is the Z-score, which is the sum of capital-asset ratio and return on assets, weighted by the standard deviation of return on assets. The Z-score measures the distance from insolvency and a higher Z-score implies a lower probability of insolvency ([Roy, 1952](#)). Alternatively, researchers have used the non-performing loans (NPLs) ratio. This proxy captures the risk of default related to the loan portfolio.

There is no academic consensus on whether bank competition leads to more or less financial soundness. Some studies support the *competition-fragility view*, while others find positive links between competition and bank stability (see Table 4). These studies differ in their samples and in the measures of competition employed. Channels whereby competition impacts bank soundness remain imperfectly known. Recent works have investigated this question. [Berger et al. \(2009\)](#), using data for banks in 23 industrialized countries, show that more market power (measured by the Lerner index) results in a higher share of non-performing loans but reduces the risk of insolvency (Z-score). The authors argue that these findings are not in opposition. Even if market power in the

²⁵[Boyd et al. \(2010\)](#) find that the likelihood of crisis, measured by government interventions, is unaffected by the market concentration, in line with [Beck et al. \(2006\)](#).

loan market results in riskier loan portfolios, the overall risk of banks need not increase if banks protect their franchise values by increasing their equity capital or engaging in other risk-mitigating techniques. This hypothesis is confirmed by [Schaeck and Cihák \(2012\)](#). They show that banks hold higher capital ratios in more competitive environments in the context of European banking. [Amidu and Wolfe \(2013\)](#) reach a similar conclusion in the case of developing and emerging countries. [Schaeck and Cihák \(2013\)](#) suggest that efficiency is the conduit through which competition contributes to stability, while [Delis and Kouretas \(2011\)](#) present strong empirical evidence that low-interest rates indeed substantially increase bank risk-taking in the Euro zone.

The context in which banks operate can impact the competition-stability nexus. [Beck et al. \(2013\)](#) document that even if the average relationship between competition and bank soundness is in line with the *competition-fragility view*, there is a large variation both over time and across countries. There are several countries for which the competition-stability view is validated. [Agoraki et al. \(2011\)](#) and [Beck et al. \(2013\)](#) provide empirical evidence that the relationship between competition and stability varies across markets with different regulatory frameworks, market structures and levels of institutional development. For instance, [Beck et al. \(2013\)](#) document that competition may be particularly harmful in countries where banks have less incentives to invest in information acquisition (more effective systems of credit information sharing), where alternative sources of finance for transparent firms exist (stock markets are more liquid), where higher risk of moral hazard is likely (deposit insurance schemes are more generous) and where financial activity is more restricted.

Insofar as the environment plays a role in determining the competition-stability nexus, it should be instructive to investigate the specificities of African economies. African banks face specific challenges that render the competition-stability nexus specific. To my knowledge, only [Moyo et al. \(2014\)](#) has investigated the relationship between stability and competition in Africa. Using information on more than 600 banks in 16 SSA countries over the period 1995-2010, they document that banks are more stable in countries with competitive banking systems (higher level of H-statistic). This study tends to show that competition enhances financial stability in Africa. Future research should be welcomed to

confirm or infirm their results. In particular, future works could investigate the channels by which competition affects stability in Africa and elsewhere (regulation, institutional development, etc.). In addition, studies employing bank-level data and the Lerner index should keep in mind that price-cost margins are influenced by a bank's risk-taking behavior (Oliver et al., 2006). Developing a risk-adjusted Lerner index to investigate the market power-stability nexus is therefore crucial.

5 Conclusion

Recent trends in financial systems in Africa raise questions about the implications of competition among banks. The literature has identified at least three reasons why competition in the financial sector is important: banking efficiency, access to finance, and stability. The literature that focuses on African banking systems is scarce and largely inconclusive.

Some papers have scrutinized the relationship between competition (or market power) and efficiency in African economies. These works have tested the SCP hypothesis or studied the relationship between market structure and margins. However, these articles focus on a handful of African countries and findings are inconclusive. In addition, many papers suffer from major drawbacks that render the results questionable. Furthermore, only an handful of papers have tested the *Quiet Life hypothesis* in Africa.

The implications of bank competition on credit availability have rarely been investigated in the case of less mature banking systems. Some works have directly or indirectly studied the relationship between bank competition and access to credit for developing countries. Unfortunately, African countries (or low-income countries) are rarely included in the samples. Further works should study directly this question using microdata or country's experience or natural experiment.

Finally, only one paper has investigated the competition - stability nexus in Africa, providing support for the *competition-stability view*. Future works (on Africa but also on other countries) special attention should be dedicated to the channels by which bank competition impacts stability.

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Tables

Table 1: The Structure-Performance hypothesis testing

Author(s)	Sample ^a	Period	Measures of		Control for ES hypothesis? ^d	Consistent with SCP hypothesis?
			Profitability ^b	Market structure ^c		
PANEL A: CROSS-COUNTRY STUDIES						
Demirgüç-Kunt and Huizinga (1999)	80 countries (5)	1988-1995	PBT/TA	CR3	Yes (Overhead)	Yes (No robust)
Flamini et al. (2009)	41 countries (41)	1998-2006	RoA	MS	Yes (Op. cost)	No
Amidu (2011)	55 countries (22)	2000-2007	RoA	Lerner	Yes (Op. cost)	Yes
PANEL B: SINGLE AFRICAN STUDIES						
Nannyonjo (2001)	Uganda	1993-1999	RoA	HHI and MS	Yes (Cost Eff.)	No
Mugume (2008)	Uganda	1995-2005	RoA	HHI and MS	Yes (Cost Eff.)	Yes
Chirwa (2003)	Malawi	1970-1994	RoA and RoE	CR3 and MS	No	Yes
Aburime (2008)	Nigeria	1980-2007	RoA and PBT/TA	CR3	No	No
Olweny and Shipho (2011)	Kenya	2002-2008	PBT/TA	HHI	Yes (Op. cost)	No
Okeahalam (1998)^e	Botswana	1996-1998	Six interest rates	CR3 and HHI	No	Yes
Okeahalam (2002a)^e	South Africa	1997-1999	Six interest rates	CR3 and HHI	No	Yes
Okeahalam (2002b)^e	South Africa, Namibia, Lesotho, and Swaziland	1997-1999	Six interest rates	CR3 and HHI	No	Yes

^a The number of African economies (when available) is reported in parentheses

^b RoA: Return on Assets ; RoE: Return on Equity ; PBT/TA: Profit before tax to total assets

^c MS: Market share ; CR3 : Fraction of assets controlled by the 3 largest banks ; HHI : Herfindhal-Hirschman Index

^d Op. Cost: Operating costs; Cost Eff.: Cost efficiency score extracted from frontier analysis

^e Methodology proposed by [Berger and Hannan \(1989\)](#) is employed

Table 2: Determinants of margins and spreads

Author(s)	Sample ^a	Period	Measures of		Consistent with SCP hypothesis?
			Int. costs ^b	Competition ^c	
PANEL A: CROSS-COUNTRY STUDIES					
Demirgüç-Kunt and Huizinga (1999)	80 countries (5)	1988-1995	NIM	CR3	Yes
Demirgüç-Kunt et al. (2004)	72 countries	1995-1999	NIM	CR3	Yes (No robust)
Detragiache et al. (2005)	84 countries (31)	1999-2001	NIM	CR5	No (opposite sign)
Laeven and Majnoni (2005)	106 countries (12)	2000	IRS	CR5	No
Beck and Hesse (2009)	86 countries	2000-2004	NIM	CR3	No (opposite sign)
Dietrich et al. (2010)	96 countries	1994-2008	NIM	CR3	No
Gelos (2009)	From 30 to 60 countries	1999-2002	NIM	H-statistic and CR5	No
Amidu and Wolfe (2012)	55 countries (22)	2000-2007	NIM	Lerner	Yes (No robust)
PANEL B: CROSS-COUNTRY AFRICAN STUDIES					
Crowley (2007)	18 African countries	1975-2004	NIM and IRS	CR3 and HHI	No
Ahokpossi (2013)	41 African countries	1995-2008	NIM	HHI	Ambiguous
Léon (2015b)	7 African countries	2004-2009	NIM and IRS	LMPI	Yes
PANEL C: SINGLE AFRICAN STUDIES					
Nannyonjo (2001)	Uganda (17 banks)	1994-1998	NIM and IRS	CR3	NIM: No / IRS:Yes
Mugume (2008)	Uganda (14 banks)	1995-2007	IRS	HHI	No (opposite sign)
Beck and Hesse (2009)	Uganda (16 banks)	1999-2005	NIM and IRS	HHI	No
Chirwa and Mlachila (2004)	Malawi (5 banks)	1989-1999	IRS	HHI	Yes
Bawumia et al. (2005)	Ghana (16 banks)	2000-2004	NIM	MS	Yes
Aboagye et al. (2008)	Ghana (17 banks)	2001-2006	NIM	HHI and Lerner	Yes
Hesse (2007)	Kenya	2000-2005	IRS	HHI	No (opposite sign)
Beck et al. (2010)	Kenya (45 banks)	2000-2007	IRS	HHI	No

^a The number of African economies (when available) is reported in parentheses

^b Intermediation costs: NIM: Net Interest Margins ; IRS:Interest Rates Spreads

^c CR_x : Fraction of assets controlled by the *x* largest banks ; HHI : Herfindhal-Hirschman Index; LMPI: Local market power index

Table 3: Bank competition and real economic activity

Author(s)	Sample ^a		Period	Method ^b	Measures of Competition ^c	Consistent with Market power view?
	Ind.	Count.				
Cetorelli and Gambera (2001)	36	41	1980-1990	C&G	CR3 and CR5	No
Deidda and Fattouh (2005)	36	41	1980-1991	C&G	CR3	Yes for LIC; No for HIC ^d
Fernández et al. (2010)	-	84	1980-2004	Growth equation	CR3	Yes (non-linear)
Claessens and Laeven (2005)	36	16	1980-1990	C&G	H-stat	Yes
Liu and Mirzaei (2013)	23	48	2001-2010	C&G	Boone indicator	Yes
Fernández de Guevara and Maudos (2011)	53	21	1993-2003	C&G	Lerner and H-stat	No
Hoxha (2013)	36	37	1994-2006	C&G	H-stat	No

^a Ind: number of industries or sectors; Count: Number of countries

^b C&G refers to the method proposed by [Cetorelli and Gambera \(2001\)](#)

^c CR x : Fraction of assets controlled by the x largest banks

^d LIC: low-income countries; HIC: high-income countries

Table 4: Bank stability and competition

Author(s)	Sample (# of African countries)	Period	Measure(s) of	
			Stability ^a	Competition ^b
<i>Papers in line with competition-stability view</i>				
Uhde and Heimeshoff (2009)	25 European countries	1997-2005	Z-score	CR3, CR5 and HHI
Boyd et al. (2009)	134 countries	1993-2004	Z-score	HHI
Schaeck and Cihák (2013)	10 European countries	1995-2005	Z-score	Boone indicator
Amidu and Wolfe (2013)	55 Developing countries (22)	2000-2007	Z-score, NPLs and Cap. Ratio	Lerner and H-statistic
Schaeck and Cihák (2012)	10 European countries	1995-2005	Cap. Ratio	H-statistic
<i>Papers in line with competition-fragility view</i>				
Yeyati and Micco (2007)	8 Latin American countries	1993-2002	Z-score	H-statistic
Turk Ariss (2010)	60 Developing countries (14)	1999-2005	Z-score	Lerner
Beck et al. (2013)	79 countries	1994-2009	Z-score	Lerner
Agoraki et al. (2011)	13 CEE countries	1998-2005	NPLs	Lerner
Fu et al. (2014)	14 Asian countries	2003-2010	Market distance to default	Lerner
<i>Papers with ambiguous or non-linear results</i>				
Berger et al. (2009)	23 industrialized countries	1999-2005	Z-score and NPLs	Lerner
Tabak et al. (2012)	10 Latin American countries	2003-2008	Z-score (SFA)	Boone indicator

^a NPLs: Ratio of non-performing loans to total loans; Cap. Ratio: Ratio of Equity to total assets; SFA: Stochastic frontier analysis

^b CR x : Fraction of assets controlled by the x largest banks ; HHI : Herfindhal-Hirschman Index

Appendix A Measuring bank competition

According to the *SCP* paradigm, market structure (i.e. concentration) is expected to influence the conduct of banks. As a result, initial studies on the industrial organization of the banking industry employed proxies of the market structure to assess the degree of competition (number of banks, share of assets held by the five largest banks, HHI). Several contributions have, however, cast doubt on the consistency and robustness of the structural approach as an indicator of competition in banking. For instance, both the theory of contestability ([Baumol et al., 1983](#)) and the theory of efficient-structure ([Demsetz, 1973](#)) argue that market structure is a weak proxy of competition.

Shortcomings in the structural approach have led to a number of attempts to collect empirical evidence on the nature of competition by observing conduct directly. The three most frequently non-structural measures of competition are the Lerner index, the Panzar-Rosse H-statistic and the Boone indicator.

The Lerner index is a measure of individual market power. The market power of a firm is identified by the divergence between the firm's price and its marginal costs (relative to price). Greater values of the Lerner index are associated with greater levels of market power.

[Panzar and Rosse \(1987\)](#) developed another measure of competition based on the transmission of input prices on firms' revenues. From the standard theory, they showed that the transmission of input price variation differs according to the degree of competition in the market (under certain assumptions). The degree of competition is therefore obtained by regressing the input prices on firms' revenues. Weak transmissions of input prices to bank's revenues are interpreted to indicate the exercise of market power in pricing. Higher values indicate more competition.

[Boone \(2008\)](#) has recently proposed a new indicator. The basic intuition underlying this indicator is that more efficient firms achieve superior performance in the sense of higher profit or higher market shares, and that this effect is stronger the heavier the competition is. The value of the Boone indicator is therefore obtained by regressing profits on marginal costs (in logarithm).

The interested reader may refer to [Léon \(2014b\)](#) for more details.

Appendix B Can bank competition help to reach the poor? Some thoughts

While bank competition has certainly more impact on the missing middle, it can also help or hinder the financial inclusion of the poorer population. The conventional view argues that enhancing competition among banks can reduce costs of financial services and therefore can improve the access and the use of financial services. [Beck et al. \(2008\)](#) find support to this view. However, bank competition might be detrimental for financial inclusion. Financial inclusion of the poorer population is mainly driven by the microfinance institutions (MFIs) in Africa. Greater competition in the banking industry might affect the performance of the MFIs and therefore their ability to reach the poor. A thinning in margins in the traditional sector because of intensified competition between banks may push them to develop new products dedicated to microenterprises ([De La Torre et al., 2010](#)). The entry of new actors can reduce the profits of MFIs, in particular if banks are able to finance the largest (and certainly most profitable) borrowers. In addition, the entry of new providers of microfinance can impact the repayment rates which should have a negative impact on profits ([McIntosh et al., 2005](#)). By contrast, the entry of banks is associated with MFIs pushing toward poorer markets ([Cull et al., 2013](#)).

Another channel whereby competition among banks might affect the financial inclusion is through the adoption of new technologies, in particular the mobile-banking (m-banking). The rapid growth of mobile phone usage has potential impacts on economic performances in Africa ([Aker and Mbiti, 2010](#)). Mobile phone technology can serve as a "silver bullet" for financial inclusion in remote areas through the development of the mobile banking and especially the mobile money transfer ([Beck and Cull, 2013](#)). The adoption of new technologies such as m-payment can be more easily in less competitive markets, which allow the provider to reach scale economies rapidly. Indeed the success of M-Pesa in Kenya has often been associated with the dominant market position of Safaricom. However, in parallel with the literature on relationship lending ([Boot and Thakor, 2000](#)), innovations may be used strategically to soften competition from other banks. The first mover may benefit from the network externalities and therefore block the entry of new suppliers in the industry. As a result, the linkages between m-banking and competition are relatively.

Appendix C Measuring credit constraints in developing countries

The traditional methodology for identifying credit constraints originates in the Modigliani-Miller theorem (MMT). [Modigliani and Miller \(1958\)](#) suggest that in frictionless markets, the investment behavior of a firm is irrelevant to its financing decisions and internal and external funds are perfect substitutes. With market imperfections, however, the level of investment is positively related to available internal funds. Empirically higher sensitivity of investment to internal funds suggests the presence of financing constraints. The main problem with this approach stems from the possibility that cash flow may be correlated with investment for other reasons (e.g. current cash flow is a good predictor of future profitability). Possible solutions are to include the Tobin Q-ratio in the estimated equation ([Tobin, 1969](#); [Fazzari et al., 1988](#); [Kaplan and Zingales, 1997](#)) or to estimate the neoclassical investment Euler equation for capital stock. The Euler equation approach is more relevant for developing countries because it does not require information on stock market values. However, some studies point out that cash flow is an important determinant of investment even in the absence of financial frictions ([Gomes, 2001](#); [Alti, 2003](#)).

Alternative empirical methodologies in identifying financing constraints also invoke the MMT but use a simple proxy of the mix between internal and external funds. The ratio of debt to total assets ([Petersen and Rajan, 1994, 1995](#); [Carbó-Valverde et al., 2009b](#)) or the trade credit ([Petersen and Rajan, 1994, 1995](#); [Jayaratne and Wolken, 1999](#)) are often employed to proxy credit constraints. However, in addition to the theoretical underpinnings, a major shortcoming is the relative scarcity of firm-level financial figures for SMEs in developing and emerging countries.²⁶

Recently, the availability of firm survey data containing questions on access to formal finance has facilitated the estimation of direct measures of credit constraints for firms. Researchers use this information in two ways. Studies use survey data on managers' perception of finance as an obstacle to growth and development ([Beck et al., 2004](#); [Beck and](#)

²⁶Identifying supply-side constraints by using the debt ratio is complex insofar as changes in debt ratio can be due to changes in demand for credit ([Carbó-Valverde et al., 2009b](#)). Moreover, studies employing trade credit assume that trade credit is one of the most expensive forms of external finance, a view challenged by recent works ([Giannetti et al., 2011](#)).

Demirguc-Kunt, 2006; Clarke et al., 2006). The survey design and measure employed are open to criticism due to perception bias or inability to quantify the severity of obstacles reported (Ergungor, 2004). Researchers often use these surveys to go in another direction and investigate the credit market experience of firms. Credit constraints are thus measured by the likelihood to obtain a loan or line of credit (Love and Martinez Peria, 2015; Mudd, 2013). However, the fact that a firm does not have credit is not sufficient to prove constraints, since this firm may not have a demand for credit, which is possible even in less developed financial markets (Bigsten et al., 2003; Cole, 2010). Hence, recent works on developing and emerging countries have tried to distinguish between constrained borrowers and other firms without a loan (Brown et al., 2011; Popov and Udell, 2012; Chong et al., 2013; Léon, 2015a). The principle is to identify only firms who are constrained due to failures/imperfections in capital markets. This measure is closer to a possible definition of credit constraints as a situation wherein a firm with a viable project cannot obtain external funds due to financial market imperfections (whereas this firm would obtain external funds in market without frictions).