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**Industrial Growth: Does Bank
Competition, Concentration and Stability
Constraint Matter? Evidence from
developed and emerging economies**

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Introduction

The contribution of financial market development to economic growth has been well studied and recognised by the literature.² This development helps to mobilize financial resources of savings, improve capital allocation and corporate governance, as well as reducing the costs of access to both investment opportunities and funds to finance business (Jensen and Meckling, 1976 and Myers and Majluf, 1984). In contrast, for banking systems as a part of the financial market, the former has attracted a good attention of research but with controversial views about the impact of bank competition development on economic growth. Particularly, the literature is quite divided on the argument for the role of large or concentrated large banks in

It is observed that external-finance-depending industries experienced slow growth in a situation where bank competition is high, which creates fewer incentives for banks in investing in the lending relationship (Rajan 1992; Petersen and Rajan 1995, and Chen, 2007). Peterson and Rajan (1995), for example, showed that countries with a few but more powerful banks are associated with the appearance of new firms, suggesting that the more concentration within a bank sector, the more this reduces the financial constraints on firms.

Cetorelli and Gamberra (2001) assess the impact of banking market structure on growth. Using a sample of 41 countries and 36 sectors over the period 1980-90, they find that the access of external-finance-dependent young firms to credits is facilitated more by a more concentrated banking system

To empirically identify rival competition in a banking sector and its competitive impact jointly with the concentration effect on growth, which is the distinctive attempt of this paper from existing studies, we take two stages for our research. First, we follow the concept of “efficiency competition” developed by Hay and Liu (1997) to set a simple model to identify rival competition in the context of bank business. The idea of the model is simple. The relationship between the market share of a bank and its cost efficiency can indicate how aggressive banks are in using their own cost advantage to compete in the market against its rivals. The strength of the relationship reflects the rival behavior of competition and its intensity. On the basis of this idea, a sample data of about 6,000 banks from 48 countries over the period 2001 to 2010 is estimated to see if rival competition exists in the banking business across countries.

Having assessed the competition of an economy, in stage two then on the basis of both the estimation method of financial development impact on growth developed by Rajan and Zingales (1998) and another by Cetorelli and Gambera (2001) that augmented the former method for their study of the industrial growth impact of bank competition, rival competition and concentration are jointly examined for their respective impact on the growth of 23 financially-dependent industries across 48 emerging and advanced economies.

One piece of evidence from our cross-industry and country estimation is that industrial growth is high within economies where rival competition is stronger. In the presence of rival competition within a bank sector, growth is also high with concentration within developed economies. The evidence

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suggesting that the test of bank competition and the growth re

To explore the spillover effect of bank rival competition on other industries empirically, there are two issues. One is about how to identify rival competition in the bank market, and another

In line with the Rajan and Zingales's development, we introduce a new variable to integrate the financial dependence of the industry and the degree of competition on an economy to evaluate the bank spillover effect on the growth of other industries. This allows us to examine whether the sectors with more demand for external finance can grow faster in the economy where more competition appears in its banking system. We examine competition jointly with the concentration for their respective effects on the growth of others in order to see the role of concentrated large banks in affecting other industries under rival competition. Thus, our augmented model for estimation is as follows:

performance has any impact on manufacturing firm or industry growth, this impact should be prominent in those that heavily depend on external finance.

In model (2), to consider the convergent effect of an industry on its output growth, we also introduce a share variable that is the initial share of an industry output in the total industrial output of an economy, and output is indicated by value added. With the convergent effect, we expect β_3 to be negative in the estimation of (2). Guiso et al. (2004) argue that the inclusion of the initial share in total value added avoids the bias derived from the possible correlation between financial development and sector specialisation. The argument is that financial development can affect both the growth of a sector and the pattern of specialisation, so it incentivises the less financially developed countries to specialise in sectors that are less dependent on external finance. Moreover, by including the share of total manufacturing value added, we predict sectors, which have grown considerably in their life cycle in the past, that are unlikely to continue to grow at a high rate in the future (see also Rajan and Zingales, 1998; Cetorelli and Gambera, 2001; and Cetorelli, 2004).

The fixed effects (industry and country) in model (2) control any unobserved industry- or country-specific heterogeneity, and finally ϵ_{it} is the error term with a normal distribution. Model (2) is estimated by cross-sectional regressions since the nature of the data is cross-industries and countries over one time span of the sample period.

Our spillover effect of bank rival competition is estimated by controlling the bank stability impact, which is a distinction from the previous model that estimates the financial development impact on growth without the stability concern. With this regard, our model can differentiate between these two effects respectively. Bank stability in model (2) is calculated on the basis of the idea of the Z-score developed by Roy (1952), further revised by De Nicolo (2000), and applied by Levy Yeyati and Micco (2007) and Turk Ariss (2010) for the evaluation of bank solvency. Our calculation of the Z-score variable is to deflate the gross return to assets by σ that denotes the standard deviation of profit returns to total assets, which is defined as $[(\text{equity capital} + \text{profits})/\text{total assets reported by the bank}]/\sigma$. The standard deviation σ is calculated on the basis of the three-year average of the deviation of a bank from the market average for the profit returns to the assets. This window of three years enables us to capture the volatility of profit returns without the significant loss of observations in

Furthermore, to estimate the spillover effect of bank rival competition on the market structure

Table 2 describes variables used in our empirical analysis of model (2) and (3) together with their data sources.

3 Data

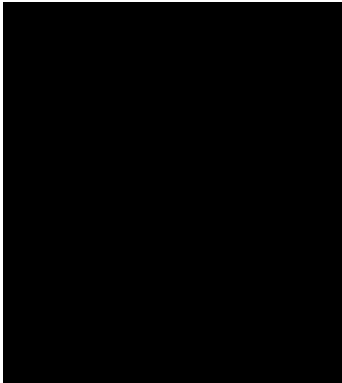
To estimate the spillover effect of bank competition, we will utilise a wide range of data across the banking sector and manufacturing industry. This study employ data from three major sources: *World Development Indicators* (published by the World Bank) for variables related to the financial development of a country, such as the private credit/GDP ratio, stock market capitalisation/GDP, and stock market turnover ratio; *the UNIDO Database* (United Nations Database on Industrial Statistics) for variables related to the nonfinancial industrial development of an economy, such as value added as the output measurement of an industry within an economy, the number of firms operating in an industry, total employment of an industry, and fixed capital formation etc. The UNIDO data provides these variables at an industry level for 23 nonfinancial sectors (the classification of ISIC Rev.3) respectively within an economy over the period 1993-2007 (Industry data are usually released with a several-year lag and the last year of available industry data at the time of writing this paper was 2007). The third source of our data is from *BankScope* which provides us with bank-level data to allow us to construct a variable that captures the intensity of bank competition in an economy over the period 2001-2010. The estimation of bank competition is provided by the authors from another study (Liu and Mirzaei, 2012) that employed the bank-level data of

The combination of data from these three major sources and other supplementary information creates a new dataset in support of our study. We take the period 2001-2007 as a single time span to construct our variables. For instance, the growth of an industry within a particular country is defined as the overall change of its valued added in real terms from 2001 to 2007. The intensity of bank competition within a country is estimated against the same time span of the similar period. The homogeneity of the time span across different data enables us to construct cross-sectional data across 23 nonfinancial sectors and 48 countries, which gives 1,104 observations for empirical estimation. Our approach to constructing the data has been made in line with the study of the financial development impact on industry growth performance, see Cetorelli and Gambera (2001), Cetorelli (2004) and Claessens and Laeven (2005).

With our new created dataset, we plot the intensity of bank competition of each country against its industry growth of different sectors, and also against the average size of the firms in each of 23 nonfinancial sectors. These two plots enable us to glance at any empirical pattern of our data in relation to the proposed relationship between bank competition and its spillover effects on the nonfinancial sectors of an economy. As can be seen in Figure 1 and 2, the pattern showing the relationship is clear. Furthermore, we also plot the bank stability measured by z-score against industry growth and against the average firm size in order to perceive the importance of the bank stability effect that needs to be controlled in the estimation.

Table 3 presents the summary statistics of the country-specific variables. The average (compounded) sectoral real growth rate of value added is 2.8%. The average firm size measured by the natural log of the respective ratio, either value added or number of employed to number of establishments are approximately 14.1 and 3.7, (in antilog 1,329,083 and 40) respectively. The average sector requires some 36% of external financing for investment, while the figures for only young or old firms are 3.8% and 73.4%, respectively. Overall bank development measured as the ratio of domestic credit in the private sector to GDP is on average some 89% but with large variations across countries, from a low of 14% to a high of 190%. See also Table A2 in Appendix for correlation matrix among interested variables.

Figure 1 Bank Competition and the Stability Constraint versus Industry Growth



The figures plot country-specific estimate of the competition (left-hand side graph) and soundness (right-hand side graph) of banking sector for 48 emerging and advanced countries over 2001-2010 with the data on the average (compounded) growth rate of value added over 1993-2007. Bank competition (efficiency competition) captures the reallocation of market share to more efficient banks from their inefficient counterparts. Bank soundness is measured on a 3-year window of the Z-score.

Figure 1 Bank Competition and the Stability Constraint versus Industry Growth

structure to estimate competition (Rajan and Zingales (1998), King and Levine (1993a), Levine and Zervos (1998), Cetorelli and Gambera (2001), and Cetorelli (2004).

Claessens and Laeven (2005) argue the quality of financial information and the development of property rights protection can affect growth. In considering the argument, we use country dummies to capture any characteristic time-invariant effects of an economy on the growth,

econometric phenomenon that the correlation between the two variables weakens either one or another's effect on the explained variable in the estimation. This correlation shows that the information of rival competition is embedded in the concentration. Therefore, the link of this embedment with the respective competition and the concentration impacts on the growth leads us to understand the evident relationship of competition and concentration with growth as *'the competitively driven concentration promotes growth'*. This is to say, a more concentrated banking market can benefit growth if market concentration arises from the process of rival competition. For instance, rival competition can make the large banks more aggressive not only in lending but also in investing in their client relationship in order to secure a market position. This argument adds a new thought in explaining the lending-relationship investment for growth promotion in the context of the rival competition. In contrast, if the concentration has not resulted from a rival process, then the concentration can lower competitive pressures on the large leading banks in supplying more credits to the industries and so affect growth adversely, which was phenomenon found by Cetorelli and Gambera (2001).

When the process is non-rivalry, we expect a negative relationship of the bank-market concentration with industrial growth. Otherwise, if the process is rivalry, a positive impact of the concentration should be expected. In our regressions, the efficiency competition measures how rival banks are in taking their cost or quality advantages to compete in the market. The inclusion of both the rival efficiency competition and the market concentration variables in the model shows how the concentration has evolved: the rival-competition-driven process of banks to be large drives efficient banks more aggressively in providing industries with a more favorable access to bank finance and so stimulates their growth. Our empirical support for this argument is established by taking into account the effect of bank stability constraint on growth. The stability of a bank is essential for growth and a more stable banking system can promote growth, which is evident by our estimation of the stability constraint on growth, see Columns 3 and 4 in Table 4.

With the findings above, our estimation further identifies a positive role of quality information and of development of property rights protection in stimulating economic growth, which is the attempt made by Claessens and Laeven (2005) to find in their study of how the quality of financial information or improved property rights protection could affect growth.

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spillover effect of bank competition and concentration on industry growth, and the second sub-section reports the robustness tests for the effect of bank competition and concentration on the market structure of the industry.

5.1. Robustness tests for industry growth

Instrumental variables

The first issue concerns the potential endogeneity of the market structure of the banking sector, although Claessens and Laeven (2005) state that by using the Rajan and Zingales' methodology the endogeneity or omitted variables concern should not exist. However, we address the potential endogeneity issue by using instrumental variables (IV) in our estimation. We use three variables as instruments. The first variable determining a country's institutional characteristics is an indicator of the legal origin of a country. The next two variables, which proxy for market size, are total population and one-year lagged GDP (measured in US dollars) of the country⁵. These types of instrumental variables are already used by a number of studies (e.g. Cetorelli and Gambera, 2001). In order to check the overidentifying restriction for each of the IV regression, we perform a Durbin-Wu-Hausman (DWH) F-test. As shown in Table 6, our estimates are very consistent with or without the endogeneity problem taken into account. The instrumented bank concentration variable is still positively related to industrial growth.

⁵ The data of GDP and population are collected from WDI, World Bank. Both variables are transformed into logarithms for estimation. The variable of legal origin is retrieved from World Bank (2004).

concentration. With these changes in the specification of competition, we also re-specify bank stability as the non-performing loans in the total loans in order to see the robustness of the variable in the estimation.

Sensitivity to different subsample countries – emerging vs advanced economies

For our further test to the robustness of competition effects on growth, we divide our data into two subsamples according to emerging and advanced economies. Table 11 presents the estimation results with a subsample of countries. In Panel A, we include 23 emerging countries, while in Panel B we include 25 advanced countries. Interestingly, the effect of efficiency competition on growth is much robust and stronger for developed markets than for the emerging markets. This exactly reflects an economic development stage that matters for market competition and its role in an economy: bank competition can facilitate growth more robustly for economies where market development is more advanced.

Interestingly, in Panel A of Table 11, we also observe that the concentration is more robust in an emerging market than in the developed. The concentration of large banks can strengthen a bank's capability to finance business, particularly, those large development projects set up by governments for growth. Large banks can also be conducive to governments in using them as an effective instrument to serve its development interest and growth policy, for instance, China's large state-owned banks. With this context, when competition is absent or weak, the high concentration of large banks can still be conducive to growth via government's role or intervention to finance provision, which is observed in our sample of emerging markets.

In contrast, when the bank market is highly competitive and rivalrous, large banks will be driven more aggressively in order to hold their market position. In this situation, the supply of

Interestingly, it can be noticed in Table 11 that countries experience high growth when their banks are more financially stable in advanced economies but not in emerging economies. This indicates that in the advanced markets the financial stability is a hard constraint on the banks in lending to industry, and the improvement of stability can reduce the lending constraint and so promote growth. In contrast, banks in emerging economies are not constrained by the financial stability for their lending, and therefore, growth is not related to the stability constraint. The decoupling of bank stability from both lending and growth implies that the banks in emerging regions are not fully commercialised with a soft stability constraint due to the possible intervention of the governments in prioritising development interests above the concern of the bank's risk constraint on lending, particularly, for large banks. This explains consistently why concentrated large banks promote growth but the stability constraint decouples from growth in emerging economies. The contrast of bank stability constraints between the two regions enriches our insights about why the bank crisis in 2008 more severely hit growth in developed economies than in emerging economies.

In this section we test the impact of alternative indicators of bank competition and the stability constraint on the market structure of industrial sectors. Specifically, we include three competition indicators: i.e. HHI index, Lerner index, and H-statistics plus non-performing loans as a proxy for the constraint of bank financial stability. Table 12 presents the estimated results. In contrast to the estimation of the competition effect on growth which is sensitive to

world. This study provides cross-country evidence on which there are higher industrial output growth and higher new business creation in economies where their banking systems are more competitive and stable.

Another distinction of this study is the pioneering attempt to measure rival competition by using the efficiency competition model as a new and direct measurement of competition in the context of the banking business. The key information embedded in the new measure is the state of competition – the non-cooperative process of banks in competing in the market for being large. As is evident by this study, the information enables the new measure to capture the spillover effect of bank competition on the growth of both outputs and new firms respectively in the non-financial industries.

The third distinction of the paper is to develop a new argument for the role of the market concentration of large banks in promoting growth. The concentration has been widely applied in banking studies as an indication of market power, and the higher power implies lower competition. This application can be misleading if the concentration of large leading banks arises from the process of rival competition. The rival or non-cooperative competition can stimulate large banks to be more aggressive in lending and investing in their client relationship in order to secure their market position, which in turn helps growth. The statistical verification of this argument has been made possible first by including both the concentration and the competition variable in estimation, secondly by checking the correlation between the two variables. As demonstrated by this study, the growth of industrial output is high in the economies where bank markets are more competitively concentrated.

When rival competition does not, or very weakly, appears, such as in emerging economies where markets are less developed, the role of concentration in promoting growth can be understood from the perspective of development. The capacity scale of large banks can be conducive to governments in employing them as an effective financial instrument in support of its development policy and growth projects. Therefore, it is not surprising to find out in our sample that the effect of the bank concentration is positive on growth for developing economies where competition is not strong.

The arguments above shall not be regarded as the replacement or substitution of the existing view that concentration reduces competition. Rather, our arguments extend the current limits in understanding concentration. We shall evaluate concentration according to how it is formed or developed. If it is formed by monopolization or cooperation or even by state

Appendi

Notes the figures for firm size are calculated as simple averages for each sector across all countries over 1993-2007.

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