

# Market concentration analysis for the Peruvian financial system (2001-2016): an empirical approach<sup>1</sup>

*Carlos Aparicio*<sup>2</sup>  
*Delivery Unit – Prime Minister’s Office*

*Diego Bohórquez*<sup>3</sup>  
*SBS - Research Department*

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## Abstract

*This short-paper explores the Peruvian financial system’s market concentration over the period 2001-2016 through different renowned concentration indices. This concept is relevant for the financial sector development, the access to financial services for households and firms, and financial sector stability. Our results suggest that the financial system is highly concentrated as a whole. However, the evidence points out to different dynamics in market concentration when analyzing credit segments separately; consumer and small-firm loans, which are usually the most vulnerable segments, appear as unconcentrated due to the entrance of several market players during the last years. The results are consistent through all concentration indices.*

**JEL classification: D4, F36, G21, G34**

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**E-Mail: [caparicio@pcm.gob.pe](mailto:caparicio@pcm.gob.pe), [dbohorquez@sbs.gob.pe](mailto:dbohorquez@sbs.gob.pe)**

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<sup>1</sup> This document does not necessarily reflect the point of view of the Superintendency of Banking, Insurance and Private Pension Funds of Peru (SBS) or the Delivery Unit at the Prime Minister’s Office (PCM).

<sup>2</sup> Carlos Aparicio is Priority Manager in the Delivery Unit at the Prime Minister’s Office (Lima, Peru).

<sup>3</sup> Diego Bohórquez is Analyst at the Research Department of the SBS (Lima, Peru).

## I. Introduction

A very common concern arises when market concentration is discussed in the context of financial systems, especially in the case of developing countries. Constant claims associate market concentration in these markets with consumer abuse, high interest rates and low quality of the services provided. There are several studies that support the traditional idea that market concentration impairs competitiveness, especially in the banking industry (Bikker & Groeneveld, 1998; Bikker & Haaf, 2002; Mamatzakis et al., 2005). However, in a market with many different products such as the financial market, a disaggregated analysis should be performed when assessing concentration. This paper goes deep inside these concepts and tries to provide some tools to analyze thoroughly market concentration in the case of Peru.

The Peruvian financial system shares several common features with others from developing countries. It is a dollarized and unsophisticated system, in which financial institutions capture deposits and work mainly allocating loans in the market. There is a small number of banking agencies sharing most of the credit portfolio, with a relevant presence of international banks currently operating (two of the top four banking institutions are international). In addition, there is a broad regulatory perimeter as there are operations from banking institutions, non-banking institutions and cooperatives.

Throughout the last decades, the financial system has shown high market concentration indices in aggregate terms. In 2001, the market<sup>4</sup> was formed by 58 institutions (15 banks and 43 non-banking institutions) with a total credit portfolio of S/ 40 million. The four biggest institutions accounted for 70% of total credit. In 2016, 54 institutions (16 banks and 38 non-banking institutions) are part of the financial system, while the size of the credit portfolio is S/ 265 million. Although the financial system has experienced a solid growth, 73% is still concentrated in the four most important institutions.

The analysis is developed using disaggregated data from credits in eight different segments for the period 2001-2016: corporate, big-sized firms, medium-sized, small-sized, micro-sized, revolving loans, non-revolving loans, and mortgage loans. The reason supporting a disaggregated analysis for the credit given by the Peruvian financial system is the heterogeneity in the market structure and competition dynamics inside each of these segments. This heterogeneity needs to be taken into account to avoid biased conclusions in measuring market concentration.

Market concentration can be measured through several statistical indices, with each of them exhibiting some advantages and disadvantages compared to other market concentration measures. This is why we choose to develop our market concentration calculations through different specifications. We use the Hirschman–Herfindahl index (*HHI*) as our main indicator, and calculated the *k*-firm concentration ratio ( $C_k$ ), the Normalized Hirschman–Herfindahl index ( $HHI^*$ ) and the Hannah and Kay ratio (HK) as well to look for consistent and robust results in our analysis.

The rest of the paper is organized as follows. In section II, we discuss the main implications of concentration and competition in the financial sector, as well as previous studies on the topic for the Peruvian context. Section III describes our empirical proposal to estimate market concentration and presents the chosen statistical indices, while section IV presents and discusses the estimation results. Section V concludes.

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<sup>4</sup>From now on, we will refer only to the private regulatory scope of the Peruvian financial system according to the Financial Stability Authority of Peru (SBS). This considers only banking and non-banking institutions (*financieras, cajas municipales, cajas rurales* and *edpymes*). Therefore, we do not consider the State bank credit positions in our analysis.

## II. Literature review

Competition and concentration are two concepts that are closely related, but their relationship is still a source of debate in the literature. Many authors mention that higher concentration leads to less competition, which is in line with general economic intuition. Nevertheless, Baumol, Panzar & Willig (1983) for example affirm that competition and concentration can co-exist depending on specific factors. For this short-paper, we use the first approach and treat both concepts as inversely related. Such a view is reasonable for emerging economies with still significant credit access gaps.

Claessens (2009) provides a list of reasons why competition in the financial sector matters. As in other industries, the degree of competition in the financial sector matters for the efficiency of production of financial services, the quality of financial products and the degree of innovation in the sector. The view that competition in financial services is unambiguously good, however, is more controversial than in other industries. Specific to the financial sector is the effect of excessive competition on financial stability, long recognized in theoretical and empirical research and, most importantly, in the actual conduct of (prudential) policy towards banks. Moreover, other complications are that the degree of competition in the financial sector can matter (negatively or positively) for the access of firms and households to financial services, in turn affecting overall economic growth.

Furthermore, the literature on banking concentration links this concept with three dimensions: i) financial sector development (including the efficiency of financial services provision); ii) access to financial services for households and firms; and iii) financial sector stability (i.e., the absence of systemic disturbances that have a major impact on the real sector). Under the first link, Besanko & Thankor (1992) for example, evaluate the consequences of relaxing entry barriers and find that equilibrium loan rates decline and deposit interest rates increase, even when allowing for differentiated competition. In addition, under access, it can be considered that access to financing improves in terms of volume and costs with greater competition, especially in emerging economies with a significant financial access gap (Petersen & Rajan, 1995; Boot & Thakor, 2000). Finally, the relationship between competition and stability are not obvious. For instance, increased competition can, for example, lead to more access, but also to weaker lending standards, as observed in the sub-prime lending market in the US (Dell'Ariccia, Laeven and Igan, 2008). Thus, banking regulators should carefully balance the entry and exit of institutions in the sector to maintain the stability of the system.

Specifically for the Peruvian context, several studies have assessed concentration and competition in the banking sector, reaching similar conclusions depending on the period and focus of the analysis. Yildirim & Philippatos (2007) as well as Levy-Yeyati & Micco (2007) affirm that competition in the banking industry increased steadily in the 90's. On the other hand, Espino & Carrera (2006) analyze the impact of concentration on the interest rate margins for the period 1995-2004, using panel data techniques at a bank level. They conclude that concentration increased between 1999 and 2003 mainly due to the process of fusions and acquisitions during that period. Another relevant result from this study is that concentration has a positive and significant impact on interest margins, and thus should be encouraged and promoted.

More recently, Moron, Tejada & Villacorta (2010) studied banking concentration and competition for the period 2002-2010. They find high levels of concentration on commercial and mortgage loans, but only moderate concentration on consumer and small-firms segments. However, using a residual demand model corrected for the quality of the product offered by each financial institution, they conclude that in

almost all segments, competition had increased during the period of analysis. These results are in line with Olivero et al. (2009), Li (2009), Bikker & Spierdijk (2008) and Claessens & Laeven (2003). Furthermore, Céspedes-Reynaga & Orrego (2014) assessed the problem of competition by using a Panzar & Rose (1987) approach for the period 2001-2013. They conclude that concentration as a whole is still at high levels, but showing a downward trend due to the entrance of several financial institutions between 2006 and 2013. In line with this, competition indices showed a slightly increase in recent years. However, the authors state that the financial system in Peru can be categorized as a monopolistic competition market.

The aim of this short-paper is to complement these studies providing an updated review of the most relevant concentration indices for each type of loan (product) offered by financial institutions since 2001. Such a long and disaggregated analysis has been possible due to a debtor-level correction made for data prior to 2010 (change in the definition of types of credit), and thus is a contribution to further studies on the topic. This segmentation allows identifying trends and particular events affecting each market in the last 15 years.

### **III. Empirical strategy**

There are several ways to estimate market concentration. However, even the most renowned concentration indices have some advantages and disadvantages compared to other measures. We choose to estimate several concentration indices to guarantee robust estimations and avoid biases related to the election of the measure. For our main conclusions, we focus on the Hirshman-Herfindahl index, since it is regularly used in the literature (Bikker & Haaf, 2000). However, the k-firm concentration ratio and the Hannah and Kay ratio are described and presented in the Annex section.

To analyze market concentration in the Peruvian financial system we consider each of the eight different credit segments: corporates, big-sized firms, medium-sized firms, small-sized firms, micro-sized firms, revolving loans, non-revolving loans and mortgage loans. The reason supporting a disaggregated analysis for the credit given by Peruvian financial institutions is the heterogeneity in the market structure and competition dynamics inside each of these segments. Therefore, we estimate all our concentration measures for each of these eight credit segments.

#### **III.1. Concentration indices**

##### **A. Hirschman–Herfindahl index (HHI)**

The Hirschman-Herfindahl index (*HHI*) is very popular in the market concentration literature and is commonly used in applications to several industries. This index is defined as the sum of the squares of the market shares of each of the financial institutions in the sample. This measure gives more weight to the larger financial institutions and extends to all financial institutions in the sample, contrary to the *k*-firm concentration ratio. This estimation avoids arbitrary cut-off points, which constitutes a clear advantage compared to (1). *HHI* is defined as follows:

$$HHI = \sum_{i=1}^n \left( \frac{S_i}{S_T} \right)^2 \quad (1)$$

where  $S_i$  is the total amount of credit given by one of the financial institutions in the sample and  $S_T$  is the total amount of credit given by all the  $n$  financial institutions inside the sample.

According to the “Horizontal Merger Guidelines” published by the U.S. Department of Justice and the Federal Trade Commission, which is considered as the typical international competition guidelines, a HHI below 1,500 characterizes unconcentrated markets, between 1,500 and 2,500 for moderately concentrated markets, and above 2,500 for highly concentrated markets. However, as mentioned in Gallardo & Dávila (2003), due to the characteristics of the Peruvian economy, in particular the size of the domestic demand, higher thresholds should be considered when comparing concentration indices.

### **B. $k$ -firm concentration ratio ( $C_k$ )**

The  $k$ -firm concentration ratio ( $C_k$ ) is a simple measure that captures the ratio of the amount of credit given by the  $k$ -largest financial institutions divided by the amount of credit given by all the financial institutions in the sample. According to Bikker (2004), this is a very popular measure of concentration in the banking literature and according to Bikker and Haaf (2002) and Beck et al. (2006) this is the predominant measure used in applied work. We can define the  $k$ -firm concentration ratio in the financial system using the following expression:

$$C_k = \frac{\sum_{i=1}^k S_i}{S_T} \quad (2)$$

where  $S_i$  is the total amount of credit given by one of the  $k$ -largest financial institutions in the sample and  $S_T$  is the total amount of credit given by all the  $n$  financial institutions in the sample. The problem with this absolute concentration measure is that the cut-off point  $k$  is arbitrary (Bikker, 2004). This disadvantage turns more relevant when analyzing samples with very different sizes. For our estimations, we use values of  $k = 3$ ,  $k = 5$  and  $k = 10$  to avoid biases related to a fixed value for  $k$ .

### **IV.3. Data**

Most of the contribution of this paper is based on the long and detailed dataset on credit portfolios for which monthly data is available. We gather information on the credit stock for each type of credit for all financial institutions operating in the financial system from 2001 to 2016. This information is collected on a monthly basis by the Financial Supervisory Authority through the Credit Report of Debtors (Reporte Crediticio de Deudores - RCD).

In June 2010, the SBS changed the criteria for determining the credit segments. Thus, the analysis required a reconstruction of the credit type to obtain long and homogeneous series since 2001. In this sense, we re-categorized every individual exposure in the 15-years window according to the new criteria, assigning a credit segment to all debtor-credit-bank observation. This is a key fact since much of the existing literature for the Peruvian market relies only on aggregated credit portfolios.

#### IV. Results

The main results are presented in Figure N°1 using the HHI index. Nevertheless, the results for other indices can be found in the Annex section. As for Corporate loans, concentration has shown an upward trend from 2001 to mid-2011. Since then, it has maintained a relatively steady level around 2,700, which indicates a highly concentrated market. Although the number of institutions granting corporate loans is 14, the four biggest banks concentrate more than 90% of the portfolio. This result is not surprising; corporate firms usually work with the four biggest banks, especially for short-term funding needs. However, this type of firms does have a strong negotiating power when it comes to loan terms, especially interest rates. In addition, corporate firms have several other sources of funding (i.e. bonds, stock market, capitalization of utilities, etc.), which minimizes the problem of concentration in this particular segment.

Regarding big-sized firms, the dynamics in concentration is similar to corporate loans, but with a significant reduction in the HHI index in recent years, from 2,584 at the beginning of 2012, to 2,188 in December 2016. This improvement does not appear to be caused necessarily by the entrance of new financial institutions (26 in 1Q2012 and 26 in 4Q2016), but to a re-ordering of market shares among existing players. Another difference with the corporate segment is that credit market to big-sized firms can be considered as moderate concentrated. However, this type of firms does also have several sources of funding and negotiating power to minimize any limitations of this context on their cost structure.

In the case of small-sized and micro-sized firms (SMEs), there important similarities and differences alike. On one hand, the HHI index in both cases has been constantly situated below 1,500, indicating unconcentrated segments. By December 2016 the index fell below 1,000, despite the absorption of MiBanco –a key player in those segments- by Banco de Crédito -the biggest bank in the system- in 2015. As a matter of fact, this event increased significantly the HHI index from 837 to 987 in small-sized firms segment, and from 653 to 930 in micro-sized firms market. On the other hand, regarding the differences between both segments, small-sized lending has constantly been more concentrated than micro-sized lending, but could converge to the same levels due to a marked reduction mainly since 2008.

These positive results are driven by the high number of enterprises participating in SMEs segments (around 48). Several non-banking institutions have SMEs as their target portfolio, and have an important presence mainly in provinces, providing funding to small firms that, because of their inherent risk, could otherwise not have easy access to credit.

As for revolving consumer loans (mainly credit cards), during most of the period analyzed it has shown low levels of concentration, characterizing an unconcentrated market. However, at the end of 2016 the HHI index (1,567) was slightly above the threshold indicating the limit to a market with moderate concentration. When considering other measures of concentration, the results as mixed. For instance, the k-firm index shows a downward trend when the 10 biggest institutions are considered, contrary to the same indicator for the 3 and 5 more important market players (see Annex section). As for the Hannah and Kay ratio, one specification (with  $\beta = 0.5$ ) shows that there was less concentration in 2016 than in the pre-crisis period (2007).

Considering the results for all the indices used, we cannot conclude that the revolving consumer loans segment is not concentrated. These levels of concentration are not explained for a lack of participants in the financial system, but maybe for the inherent risk and complexity of the segment.

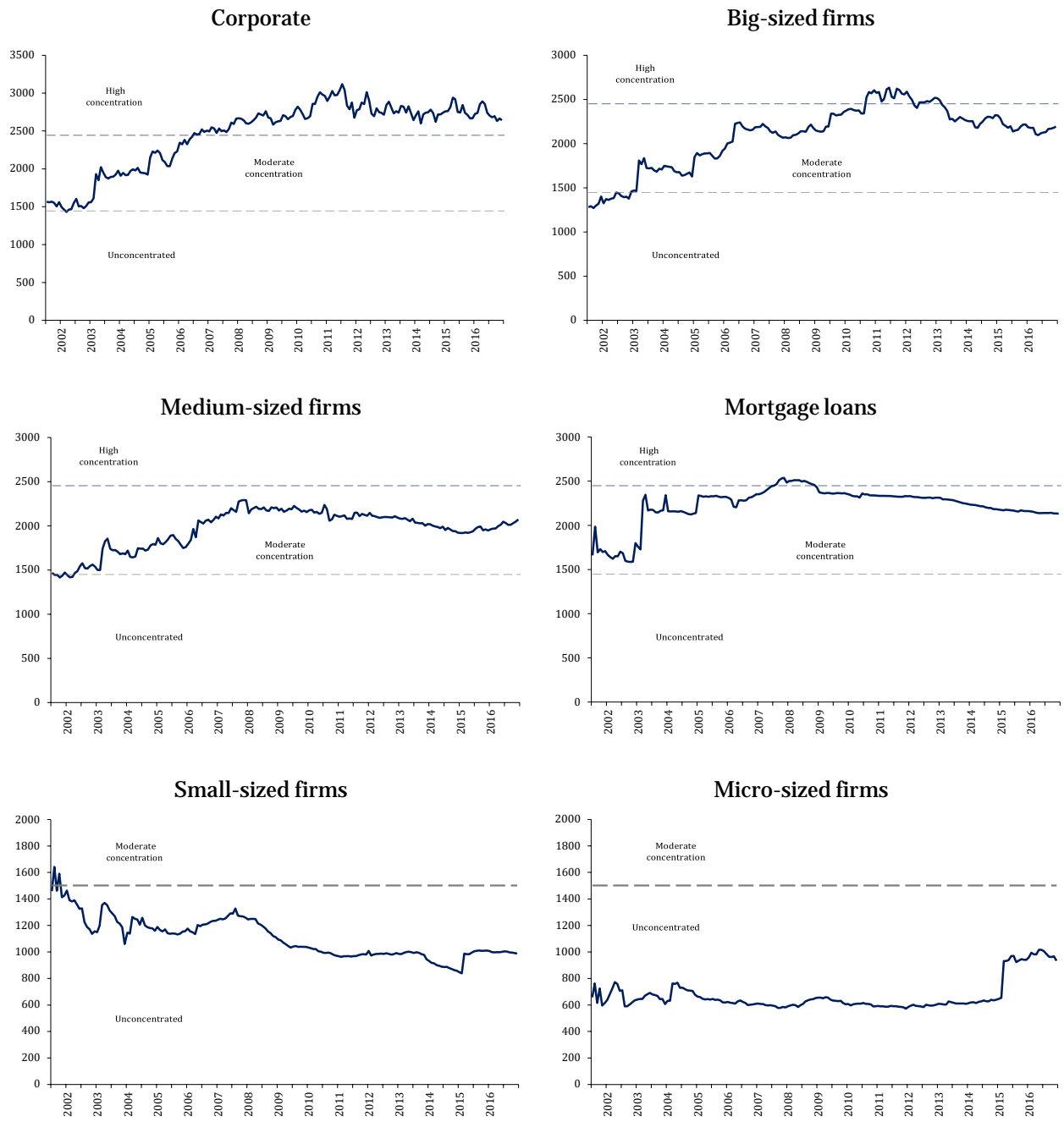
Granting a credit line can be risky for any financial institutions and requires solid credit-granting standards, and thus only few specialized ones can manage this type of business. For instance, non-banking institutions do not offer credit cards, which tends to increase concentration ratios as only banks are considered.

For non-revolving loans, the market is indisputably unconcentrated, showing a HHI of 985 by the end of 2016. This segment has maintained a stable level of concentration (around 1,000) for the last 13 years. There are 50 institutions in the financial system that grant this type of loans, thus even the 10-firm concentration ratio lies below 80%.

Finally, medium-sized firm (ME) and mortgage loans can be categorized as markets with moderate concentration. With a few exceptions, both have maintained this category for the whole sample. However, since 2008 concentration has experienced a constant reduction, following the same pattern as other segments. A possible explanation for the relatively high levels of concentration in ME loans is related to the size of the loans. Similar to the case of SMEs, there are 48 institutions participating in the market, but the four biggest banks account for 80% of the portfolio, contrary to small-sized firms (35%) and micro-sized firms (18%). This shows that concentration in this segment is not driven by a lack of market players, but on different risk profiles of the borrowers. For example, less-riskier borrowers would ask for a loan in one of the important banks to avoid possible restrictions in terms of the loan amount. On the contrary, riskier borrowers would ask for financing to a non-banking institution with higher interest rates and smaller loan amounts. These differences are a part of the banking industry and present in other segments as well such as SMEs, but are more notorious due to the magnitude of the loan amounts.

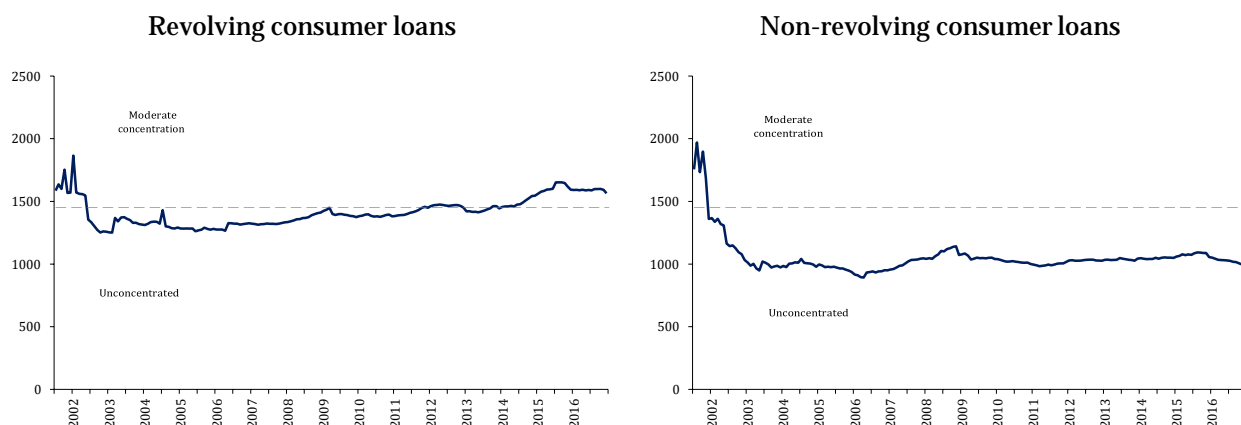
Regarding mortgage loans market, it is composed by 31 institutions, but only 5 concentrate more than 90% of the portfolio. In this particular case, concentration appears as significant in terms of volume and number of loans granted. To analyze this situation, it is important to consider the context and the type of business associated with mortgage loans. To offer such a product, the institution needs to have strong levels of capital, due to the size of the loans. Furthermore, it has to be in a position to tolerate important losses in case of a default. Besides, a mortgage loan is usually offered with a maturity of 20 or 25 years, which makes it difficult to manage in terms of financial planning for the institution. Finally, mortgage loans are usually associated with collaterals and, in the case of a default, the institution must have the capability to go through a process of recovery of the asset that can take years. All these factors complicate the participation of more players in this segment. Concentration in mortgage loans market will improve as the financial system develops and financial institutions follow more solid practices that can lead them to more complex operations. It is worth mentioning that interest rates for medium-sized firm loans and mortgage loans decreased in recent years, which is evidence that concentration has not necessarily increased the price of the product offered.

**Figure N°1: Hirschman-Herfindahl index by type of credit (points)**



Source: SBS - RCD





Source: SBS - RCD

## V. Concluding remarks

The credit portfolio from the Peruvian financial system appears as concentrated as a whole, but with mixed results when considering different segments in the analysis. For instance, according to the HHI index, corporate loans form a highly concentrated market; big-sized firms, medium-sized firms and mortgage loans are granted in a market with moderate concentration; while small-sized firms, micro-sized firms and non-revolving consumer loans are markets characterized as unconcentrated. It is not possible to conclude that revolving consumer loans are associated with an unconcentrated market.

For every segment, concentration indices have shown important reductions since 2007-2008. This might be explained mainly by the entrance of several financial institutions between 2006 and 2013. In this context, there are important differences between segments that reflect the heterogeneity in the financial system in terms of risk profiles, size of the banks, and core business. For instance, by December 2016, 50 institutions were participating in the non-revolving consumer market, while only 14 of them offered revolving loans (mainly credit cards). These differences are the reason why a disaggregated analysis was necessary to understand the dynamics behind financial concentration.

Concentration in corporate and big-sized firms lending does not appear as a relevant issue, since most of these firms have a strong negotiating power over the financial institution, as well as other sources of funding for their short-term lending needs. Regarding medium-sized firms loans, the concentration analysis might be determined by the size of the loans, rather than the number of institutions in the market. Thus, the inherent heterogeneity in the risk profiles of borrowers might be highlighted in this segment due to the limits to the size of the loans. As for mortgage loans, only a few institutions are capable of dealing with the complexity of them (long maturities, collateral recovery, large loan amounts, etc.), and thus the market will be less concentrated when the financial system develops and more institutions follow adequate procedures to strengthen their financial position.

Finally, the results regarding small-sized and micro-sized firms lending, as well as non-revolving consumer loans are encouraging. These segments are inescapably unconcentrated, which tends to benefit financial inclusion and thus, economic development. Many households and small firms in these segments have benefitted from this process in recent years. To complement this analysis it would be important to assess the problem of competition in the financial system by type of credit.

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## Annex

### **Normalized Hirschman–Herfindahl index ( $HHI^*$ )**

The Normalized Hirschman-Herfindahl index ( $HHI^*$ ) standardizes and limits the value of  $HHI$  by subtracting the numerator and denominator of (2) by the reciprocal of the total number of financial institutions in the sample.  $HHI^*$  is defined as follows:

$$HHI^* = \frac{(HHI - \frac{1}{n})}{1 - \frac{1}{n}} \quad (3)$$

where  $HHI$  is the Hirschman-Herfindahl index as defined in (2) and  $n$  is the total number of financial institutions in the sample. While  $HHI$  ranges from  $\frac{1}{n}$  to 1,  $HHI^*$  ranges from 0 to 1.

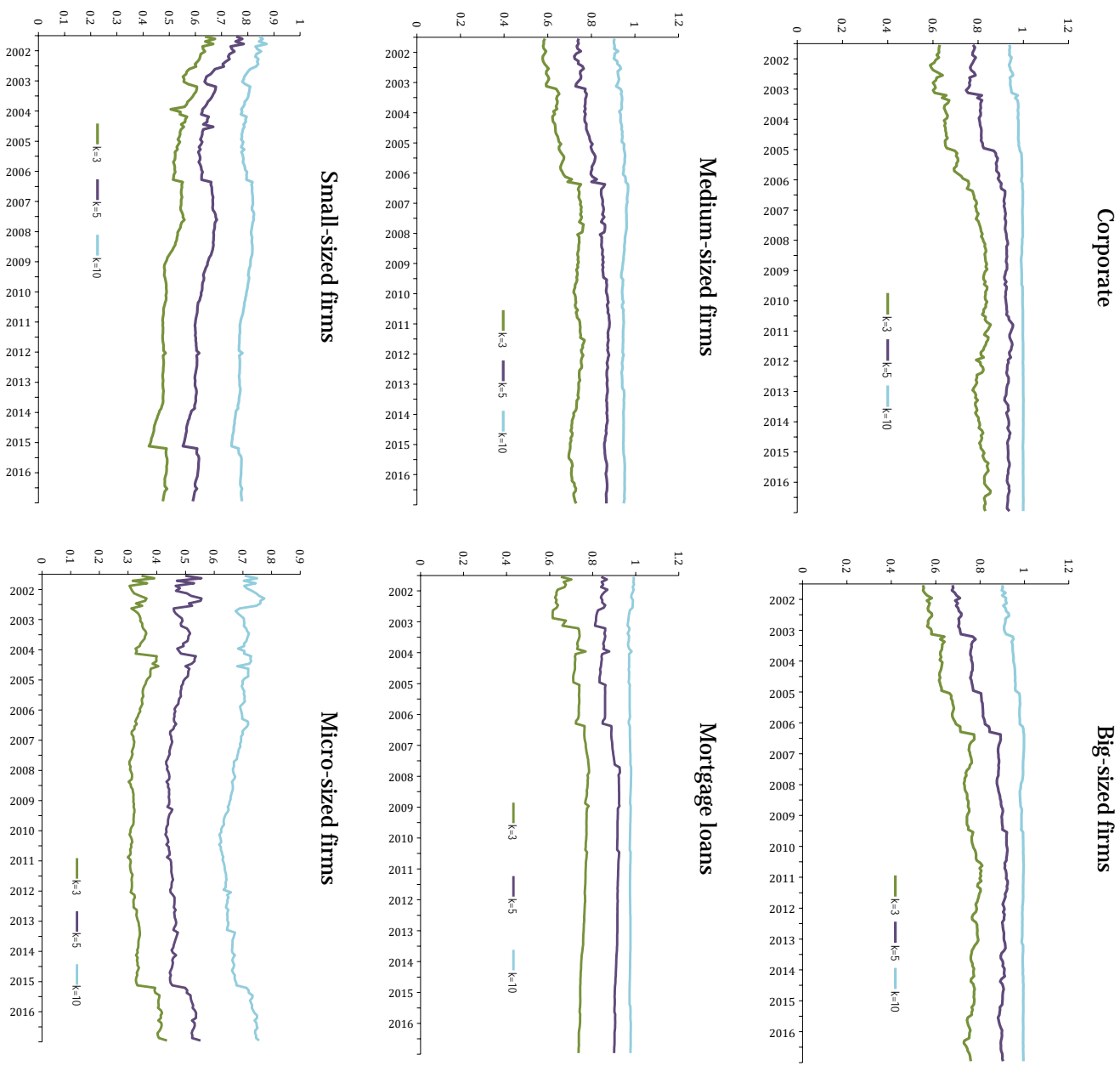
### **Hannah and Kay ratio ( $HK$ )**

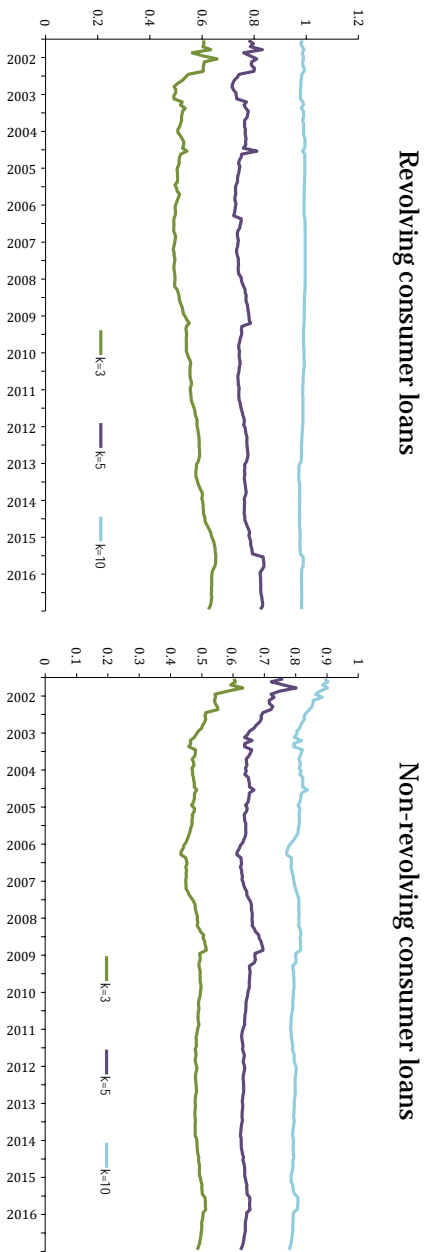
This measure is a variation of the Hirschman-Herfindahl index in which you can assign more or less weight to the largest firms in the market.

$$HK = \left[ \sum_{i=1}^n \left( \frac{S_i}{S_T} \right)^\beta \right]^{\frac{1}{\beta-1}} \quad \beta > 0 ; \beta \neq 1 \quad (4)$$

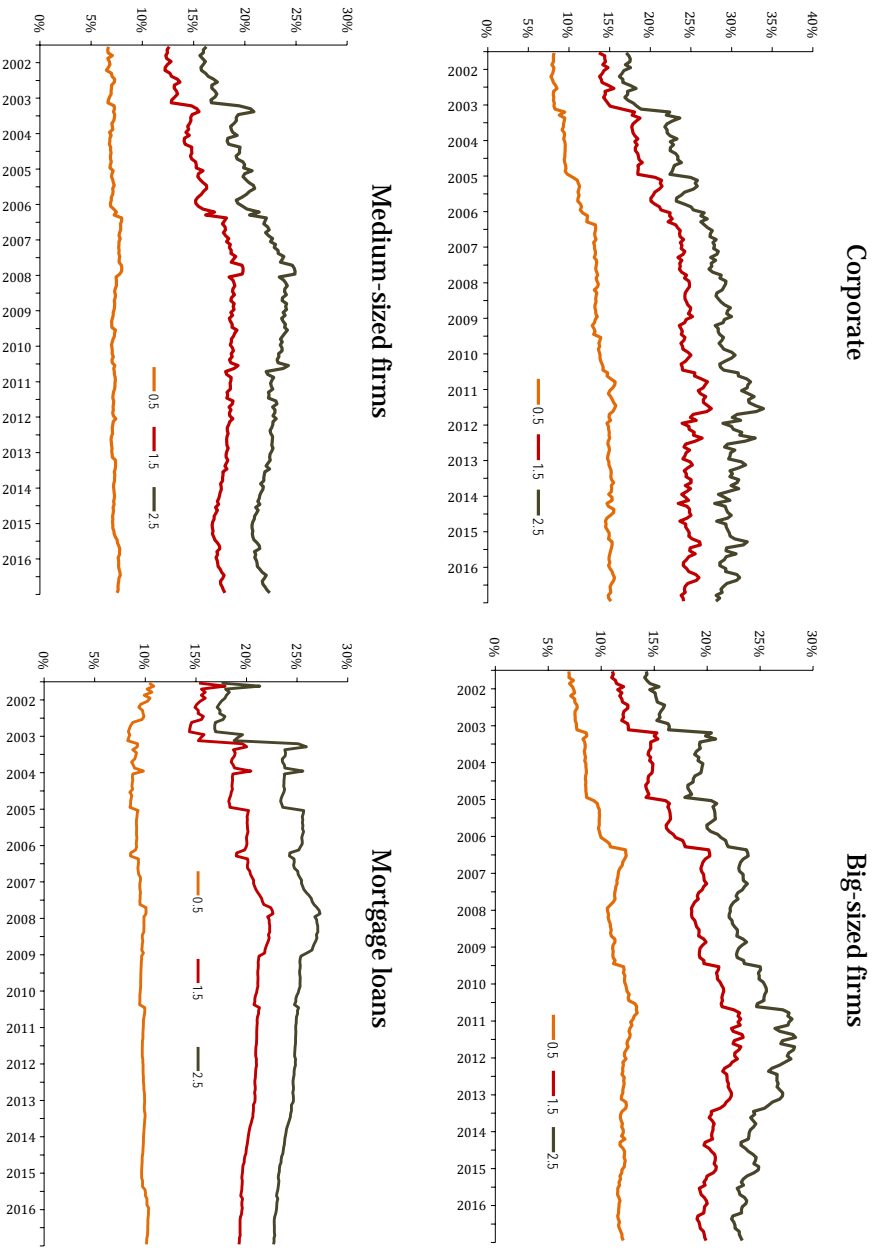
where  $S_i$  is the total amount of credit given by one of the financial institutions in the sample,  $S_T$  is the total amount of credit given by all the  $n$  financial institutions in the sample, and  $\beta$  is a parameter that allows to assign more or less weight to the largest financial institutions (higher values of  $\beta$  assign more weight to the largest firms). Although giving more or less weight to the largest financial institutions could be very important for intuition purposes, interpretation for  $HK$  is complex in empirical applications. In this sense, this measure should be used as a complement to other measures and not the only one consulted for concentration estimation purposes. The selection for the value of  $\beta$  is arbitrary and assigns more complexity to its interpretation. We use values of  $\beta = 0.5$ ,  $\beta = 1.5$  and  $\beta = 2.5$  to avoid biases related to a fixed value for  $\beta$ .  $\beta = 2$  turns  $HK$  into  $HHI$ , in practice.

**Figure 2: k-firm Concentration ratio by type of credit**  
(points)

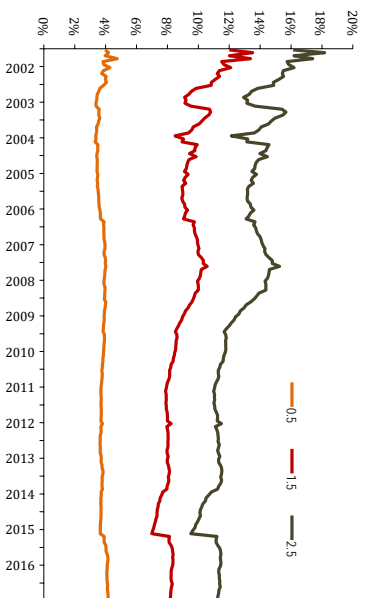




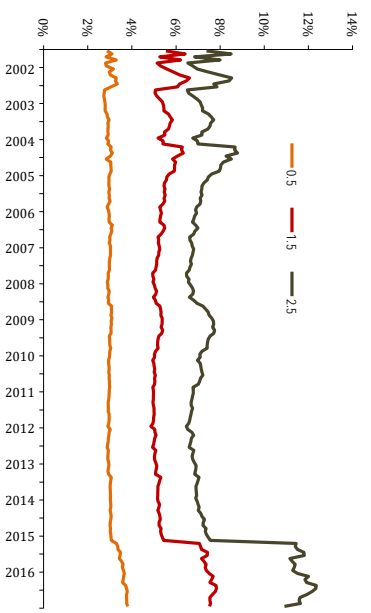
**Figure 3: Hannah and Kay ratio by type of credit (points)**



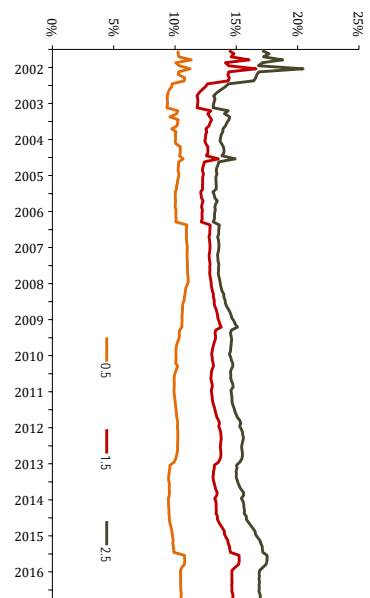
### Small-sized firms



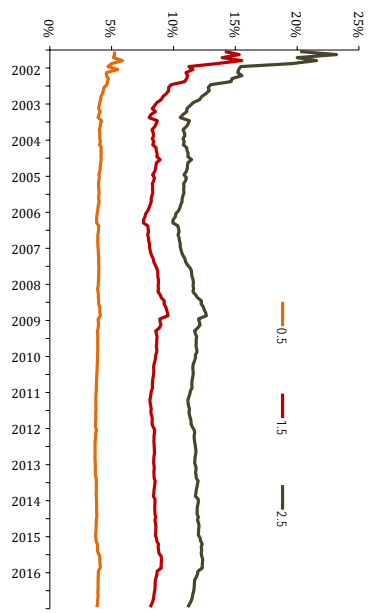
### Micro-sized firms



### Revolving consumer loans



### Non-revolving consumer loans



Source: SBS - RCD