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## Contribution of Rural Banks to Regional Economic Development: Evidence from the Philippines

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**Contribution of Rural Banks to Regional Economic Development: Evidence from the Philippines**

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4 Contribution of Rural Banks to Regional Economic Development:  
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7 Evidence from the Philippines  
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8 Abstract:

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10 We examine the link between banking and economic development in the Philippine regions  
11 and focus on the role of rural banks using a cointegration panel data analysis (1993-2005). We  
12 find no clear-cut evidence of a positive influence of banking development measured by  
13 traditional indicators built at the regional level for the whole banking industry. But, we find a  
14 consistent positive effect of rural banks in the intermediate and less developed regions, with a  
15 stronger effect for the former, suggesting a threshold effect. Estimations on rolling sub-  
16 samples confirm the differentiated impact of rural banks depending on the stage of regional  
17 development.  
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34 JEL Classification: C23; G21, O16

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36 Keywords: Banking development; Regional economic development; Banking structure; Panel  
37 cointegration; Rural banks.  
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## Section 1. Introduction

During the last thirty years, the extent to which a better-developed financial system fosters economic development has been the subject of extensive research. Following Levine, 2005, five broad functions provided by the financial sector that reduce information, enforcement and transaction costs are identified: (i) production of information on investment projects and capital allocation; (ii) monitoring and effective corporate governance; (iii) trading, diversification and management of risk; (iv) saving mobilization and (v) easing the exchange of goods and services. The way these five functions are supplied by the financial system influences saving rates, investment decisions, technological innovation and hence economic activity. Since King and Levine, 1993a and 1993b, a large number of empirical studies have analyzed the finance-growth nexus for developed as well as developing countries (see Wachtel, 2003, and Demirgüç-Kunt and Levine, 2008, for comprehensive surveys). While empirical studies used different methodologies to explore the finance-growth nexus, they find overall consistent results on the sign of the relationship. Countries with better-developed financial system tend to grow faster. A contentious area of research investigates the causality of this relationship (King and Levine, 1994; Demetriades and Hussein, 1996; Wachtel and Rousseau, 1995). Some researchers assert that it is financial development that fuels growth (King and Levine, 1993a, 1993b; Christopoulos and Tsionas, 2004; Demirgüç-Kunt and Levine, 2008) while others, following Robinson, 1952, find that improvements in productivity and economic output would require increased investment and funding (Jung, 1986; Ireland, 1994). Other studies claim that this causality is actually bi-directional (Demetriades and Hussein, 1996).

The mechanisms through which financial and economic development are linked remain also an open question. Berger et al., 2004, and Demirgüç-Kunt and Levine, 2008, highlight different dimensions of the financial system that could matter.<sup>1</sup> A crucial mechanism

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3 is the reduction of financial constraints for firms that heavily rely on external finance.  
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5 Following Rajan and Zingales, 1998, and Demirgüç \_Kunt and Maksimovic, 1998, micro-  
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7 level as well as industry-level studies show that in better-developed financial system, firms or  
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9 industries that strongly rely on external finance tend to grow faster. Within this context, the  
10  
11 extent to which the banking system could influence the access to finance is obviously a key  
12  
13 issue. More specifically, some authors argue that small, regional and locally-owned banks  
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15 could behave very differently from large, national and non locally-owned banks for a variety  
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17 of reasons. A superior access to local information, a competitive advantage in the relationship  
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19 lending segment of the market and a greater commitment to local prosperity could enable  
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21 them to better monitor and assess risk of local firms. The presence of these banks could then  
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23 have a specific influence on local development by improving financing opportunities to small  
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25 and medium size enterprises. In countries that have undergone a process of banking  
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27 consolidation, concerns have been raised that local banks may not be able to compete with  
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29 national-wide banks and then to offer specific banking services to local communities  
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31 especially the small and medium-size enterprises in the future (Avery and Samolyk, 2004 ;  
32  
33 DeYoung et al., 2004; Usai and Vannini, 2005). Whereas some empirical studies assess the  
34  
35 link between financial and economic development at the regional level (Rodriguez-Fuentes,  
36  
37 1998; Carbo Valverde and Fernandez, 2004; Guiso et al., 2004) and stress the influence of  
38  
39 local banks in developed countries (Collender and Shaffer, 2003; Usai and Vannini, 2005;  
40  
41 Hakenes et al., 2009),<sup>2</sup> only few address this question in the case of a developing country  
42  
43 (Burgess and Pande, 2003 and 2005; Kendall, 2009). Indeed this question is of crucial interest  
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45 in these countries where economic development is hampered by insufficient and inadequate  
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47 access to financial services especially in rural areas. Focusing on the sub-national level  
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49 enables to examine the link between financial coverage or capacity and economic  
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51 development in less developed – rural areas. When testing the influence of the expansion of  
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3 the rural branch network at the state level in India over the 1961-2000 period, Burgess and  
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5 Pande, 2003 and 2005, highlight an increase in the per capita output and a reduction in rural  
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7 poverty. Such a positive effect on less-developed rural areas in India is confirmed at the  
8  
9 district level during the 1990s by Kendall, 2009.  
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12  
13 We aim to extend this scarce literature on developing countries by conducting a  
14  
15 banking market analysis at a sub-national level. The originality of our paper is to assess the  
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17 impact of local bank market share on regional economic development. Our goal is to analyze  
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19 the relationship between banking and economic development in the Philippines by taking into  
20  
21 account the weight of the banking industry dedicated to local financing in rural areas.  
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25 We study the case of the sixteen regions of the Philippines. Quite significant  
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27 disparities in the level of economic and banking development across the sixteen regions raise  
28  
29 interesting issues on the finance-growth nexus and the specific influence of local banks.  
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31 Moreover, as pointed out by Carbo Valverde et al., 2007 and Kendall, 2009 focusing on a  
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33 single country enables us to assume that macroeconomic framework and political governance  
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35 (monetary and exchange rate policies, banking regulation, education and health policies,  
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37 industrial policy ...) are relatively homogeneous across the country.  
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41 In the Philippines, the current financial system is considered to be bank-based because  
42  
43 of the dominance of banks in the country as evidenced by the limited presence of equity  
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45 markets as source of finance (Gochoco-Bautista, 1999), and the fact that only the largest  
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47 corporations are listed in the country's stock exchange. Hence funding for the majority of  
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49 businesses in the country is expected to be sourced primarily from banks and not through  
50  
51 financial markets (Gochoco-Bautista, 1999; Asian Development Bank, 2007). The formal  
52  
53 banking system is composed of three categories of banks: universal and commercial banks,  
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55 thrift and private development banks, and regional rural and cooperative banks.<sup>3</sup> Although the  
56  
57 formal banking system is dominated by commercial banks, rural banks in the Philippines were  
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3 primarily established to promote and expand the rural economy. They generally cater to small  
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5 borrowers including farmers, entrepreneurs, market vendors, business owners, wage earners,  
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7 teachers and cooperatives. From the 1960s to the 1980s, rural banks served as conduits of  
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9 subsidized loan funds from the government and international donors and were plagued by  
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11 high default rates, insolvent lending programs, and high operating costs to name a few  
12  
13 (Agabin and Daly, 1996). Following the process of financial liberalization that occurs in the  
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15 Philippine during the last two decades, the government shifts toward a more market-orientated  
16  
17 approach credit policy for rural areas.<sup>4</sup> Recent government policies have led to strengthen the  
18  
19 place of rural banks by enhancing their role in financing micro-entrepreneurs and poor  
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21 households because of their potentially deeper market penetration.  
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27 To assess the specific influence of rural banks on economic development, we conduct  
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29 an empirical investigation over the period 1993-2005 using an original set of regional banking  
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31 data.  
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34 The sixteen Philippine regions are ranked in three groups depending on average  
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36 economic development (developed regions, intermediate developed regions and less  
37  
38 developed regions). Rank-order correlation tests provide us some first interesting results.  
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40 Whereas a negative and significant correlation between economic development and rural bank  
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42 presence is obtained while considering all the sixteen regions together, an opposite result is  
43  
44 found when only considering the less developed regions.  
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48 Building on the works of Christopoulos and Tsionas, 2004, and Apergis et al., 2007,  
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50 which take into account the integration properties of the data, a panel cointegration analysis is  
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52 conducted. This econometric specification enables, on the one hand, to address the  
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54 heterogeneity of economic development and banking coverage of the regions and, on the  
55  
56 other hand, to efficiently utilize the limited regional data available presently as annual  
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58 banking regional data do not exist prior 1993. This specification also provides some insights  
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3 on the causality between economic and banking development. If the estimations do not show  
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5 the existence of a strong relationship between regional banking and economic development in  
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7 the Philippines, the findings highlight a positive effect of the presence of rural banks on  
8  
9 economic development.  
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12 The remainder of the paper is organized as follows. Section 2 briefly describes  
13 regional characteristics of the Philippines. Section 3 presents the research design and results.  
14  
15 Section 4 concludes the paper.  
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17

## 22 Section 2. Discrepancy in the regional economic and banking development in the Philippines

### 24 2.1 Data description

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26 This paper uses an original dataset made of regional banking data in order to analyze  
27 specifically how differences in economic development might be explained by disparities in  
28  
29 the banking system at the regional level, underlying the role of rural banks. The  
30  
31 macroeconomic regional data are from the Philippine National Statistics Office and National  
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33 Statistical Coordination Board. Bank regional data comes from the Central Bank of the  
34  
35 Philippines (Bangko Sentral ng Pilipinas). The studied period is from 1993 to 2005. The  
36  
37 dataset could not start prior to 1993 as the organization of the regions in the Philippines was  
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39 different.<sup>5</sup>  
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46 An originality of this paper is that we used regional level banking aggregated data for  
47 the three types of banks (commercial banks, thrift banks and rural banks). However we did  
48  
49 not have access to individual data for all types of banks. The Central Bank aggregates data per  
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51 bank branch office to a regional level. For thrift and rural banks which operate mainly at a  
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53 regional level, this information is publicly available. However regional data for commercial  
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55 banks, which operate at a national level, are not publicly available and are directly provided  
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60 by the Central Bank of the Philippines.

## 2.2 Regional economic development

The Philippines are divided into seventeen geographic regions. For this study however, we refer to only sixteen regions, having integrated Region 4-A, Calabarzon and Region 4-B, Mimaropa (Region 4 was divided into two separate jurisdictions only in 2002). The per capita real gross regional domestic product (PC\_RGRDP) is used as a measure of the regional economic structure and ranking of the regions depending on this variable has remained relatively constant over the period covered by this study. In view of the heterogeneity of the stages of economic development, we classify the regions into three groups: less developed, intermediate developed and developed regions. Table 1 presents the real per capita gross regional product of the regions. The National Capital Region (NCR) is the most developed region and the Autonomous Region in Muslim Mindanao (ARMM) has the lowest per capita RGRDP among the regions in the country.

Based on simple statistical analyses of the above data, we identify the less developed regions to be the following: Ilocos, Cagayan Valley, Bicol, Eastern Visayas region, Zamboanga Peninsula, the Autonomous Region in Muslim Mindanao (ARMM) and Caraga. These regions are basically agriculture intensive with lower levels of industrialization. Their regional contribution to the Philippine GDP as of 2005 is below 2.9% whereas their inhabitants account for 26.4% of the Philippine population.

The developed regions, NCR, Cordillera Administrative Region (CAR), and Northern Mindanao are those with a strong service sector coupled with a vibrant industrial sector characterized by a large number of business establishments. CAR is classified as developed in view of the presence of the province of Benguet in the region, which is highly developed and which greatly improves the ranking of the region despite the significantly poorer economic

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3 performance of the other provinces in the region. Central Visayas (with Cebu province) and  
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5 Davao (with Davao del Sur province) regions, despite being more highly urbanized than  
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7 Northern Mindanao and the CAR, were not classified in this group in view of the lower  
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9 ranking of their per capita RGRDP levels as of 2005.  
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12 The intermediate developed regions are comprised of those regions that were not  
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14 classified as developed or as less developed and include Central Luzon, South Luzon,  
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16 Western Visayas, Central Visayas, Davao and Socksargen.  
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22 [Insert Table 1]  
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### 27 2.3 Regional banking structure 28

29 Table 2 presents descriptive statistics for some banking indicators at the regional level.  
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31 Two measures of the regional banking activity are provided: total deposits and total net loans.  
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33 To measure banking development (BD), four different measures are used: three measures of  
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35 financial depth (the share of total net loans over nominal regional gross domestic product  
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37 (Loans), the share of total deposits over regional gross domestic product (Deposits), the  
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39 number of banking offices per capita (Banking office density)) and one measure of local  
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41 intermediation (total net loans over total deposits (Intermediation)). Recent studies (Berger et  
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43 al., 2004; Hasan et al., 2009) suggest to measure financial development using quality-based  
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45 indicator instead of quantity-based. Unfortunately, the individual bank data required to  
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47 construct such measures are available only for few commercial banks but not for rural banks  
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49 in the Philippines. Finally, two measures of rural banks presence are computed: the share of  
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51 net loans granted by rural banks per region over total net loans granted per region (RB Loan  
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53 share),<sup>6</sup> and the share of total resources of rural banks per region over total resources for all  
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55 banks per region (RB Resource share). We will consider the whole sample “All regions” and  
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3 the four sub-samples “Developed regions”, “Intermediate developed regions”, “Less  
4 developed regions”, and, “All regions except NCR” given the macroeconomic specificities of  
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6 the NCR region.  
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9  
10 Three main results can be highlighted.  
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12 First, considering either the sample “All regions” or the sub-sample “All regions  
13 except NCR” allows us to show the predominance of the NCR region in terms of banking  
14 development.  
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19 Second, the three other sub-samples are characterized by a great heterogeneity of  
20 banking development. As an example, the mean value of the share of total net loans over  
21 nominal regional gross domestic product (Loans) ranges from 0.10 to 0.69 when considering  
22 respectively the sub-samples “Less developed regions” and “Developed regions”. Whatever  
23 the measure used (intermediation, deposits and banking office density), we still find  
24 heterogeneity through Philippine regions and they show that the wealthiest regions have  
25 greater banking development.  
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36 The third result is related to the presence of rural banks. Whatever the measure used  
37 (RB Loan share, RB Resource share or RB office density), the presence of rural banks is  
38 higher on average in the less developed regions than in the intermediate developed regions,  
39 itself higher than in the developed regions. 21.22 % of the total average amount of loans are  
40 granted by rural banks in the less developed regions against 13.46 % in the intermediate  
41 regions and 0.37 % in the developed regions.  
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52 [Insert Table 2]  
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57 To analyze more precisely rural bank presence, Table 3 and Table 4 provide  
58 information respectively on the market share of the different types of banks (commercial  
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3 banks, thrift banks and rural banks) at the national level and of the rural bank market share at  
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5 the regional level.  
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10 The formal banking sector is dominated by commercial banks,<sup>7</sup> which over the 1993-  
11 2005 period represent 56.8% of the total number of bank offices in the Philippines. The thrift  
12 banks represent 17.8% of the total number of bank offices and the remaining 25.37% of the  
13 total banking offices operating in the country are regional rural and cooperative banks.  
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22 [Insert Table 3]  
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26 Commercial banks remain the major source of funding with an average credit market  
27 share of 89% and 73% when considering respectively the sample “All regions” and the sub-  
28 sample “All regions except NCR”. However, at the national level, rural banks accounted, on  
29 average, for 38% of the total number of banking offices and granted 14% of the total amount  
30 of loans, when excluding the NCR over the 1993-2005 period. Moreover, since 1998, Figure  
31 1 shows for loan market share a decline of commercial banks (from 77% to 65%), a stability  
32 of thrift banks (12% to 11%) and, at the same time, a sharp increase of rural banks (from 11%  
33 to 24%).  
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45 [Insert Figure 1]  
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50 Table 4 provides information on the evolution of rural bank market shares between  
51 1993 and 2005, and shows heterogeneity across regions. We can first notice that whatever the  
52 region considered, rural banks increase their market share with regard to their resources and  
53 the loans they grant. The analysis of the evolution of rural bank office density is less  
54 straightforward. Their presence has been strengthened through the period. Indeed they were  
55 legally allowed to increase the number of their branches provided that they develop their  
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3 microfinance activities (see Dauner Garniol et al., 2005). But this indicator is altered by the  
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5 growth of the population, which varies among the regions.  
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10 [Insert Table 4]  
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#### 15 2.4 Rank order correlation tests 16

17 In order to analyze the heterogeneity in the banking structure and in the regional  
18 economic development stressed in tables 2, 3 and 4, and as a preliminary step of the  
19 empirical investigation, we test for correlation between selected banking and economic  
20 development indicators.  
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27 Rank order correlation tests are performed using the sample “All regions” and the  
28 four sub-samples “All regions except NCR”, “Developed regions”, “Intermediate developed  
29 regions”, and “Less developed regions”. Table 5 presents the results of the correlation  
30 analysis using Spearman rank-order tests. The null hypothesis is the absence of rank-order  
31 correlation between the two variables.  
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41 [Insert Table 5]  
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46 Three main results are obtained from the rank order tests. First, a positive and  
47 significant correlation between economic development and financial depth at the regional  
48 level is obtained when financial depth is measured by banking office density and deposits for  
49 four of the five samples. This result is consistent with the existing empirical literature on the  
50 finance growth nexus. The correlation obtained is stronger for the sub-sample “Developed  
51 regions” than for the sub-samples “Intermediate developed regions” and “Less developed  
52 regions”. When the Loans variable is used as an indicator of financial depth, the correlation is  
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3 also significant for the developed regions but not for the intermediate and less developed  
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5 regions. When banking development is measured as the ratio of total net loans to total  
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7 deposits (Intermediation), we find a positive and significant correlation for two sub-samples,  
8  
9 “All regions” and “Developed regions”.

10  
11  
12 Second, rank order tests show different results for the sub-sample “All regions except  
13  
14 NCR”. A positive and significant correlation is obtained between economic and banking  
15  
16 development only when the bank office density is used as a measure of financial depth.  
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20 Third, the most interesting result with regard to our issue is related to the role of rural  
21  
22 banks on regional economic activity. A negative and significant correlation is obtained  
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24 between economic development and rural banks presence for the sample “All regions” and the  
25  
26 sub-samples “All regions except NCR” and “Developed regions”. On the contrary, a positive  
27  
28 and significant correlation is obtained between the variables PC\_RGRDP and the market  
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30 share of rural banks, which means that the higher is the market share of rural banks, the higher  
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32 is the regional economic development.  
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### 39 Section 3. Empirical framework and estimation results

#### 40 41 3.1 Panel data unit root tests

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43 The lack of agreement in the literature on the impact of financial development on  
44  
45 economic growth (its existence, level or sign) is argued to arise primarily from the estimation  
46  
47 techniques used to assess this relationship (times series, panel data, see Apergis et al., 2007).  
48  
49 According to Apergis et al., 2007, the cross-sectional estimation methodology misses (i) to  
50  
51 address the issue of integration and cointegration properties of the data, and (ii) to examine  
52  
53 the direction of causality between economic and financial development. In estimating panel  
54  
55 data, Apergis et al., 2007, point out that using instrumental variables and GMM dynamic  
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57 panel estimators alone to account for potential biases induced by simultaneity of regressors,  
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3 omitted variables and/or unobserved country-specific effects on the finance-growth nexus  
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5 may be insufficient. The integration properties of the data should be considered.  
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8 Following this methodology and in order to explore the relationship between banking  
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10 development, economic development and the effect of rural banks, we first conduct panel unit  
11  
12 root tests on the dataset. We used the Im, Pesaran and Shin (IPS) test, which is based on  
13  
14 individual ADF regressions and assumes a separate unit roots between the cross-sections units.  
15  
16 The null hypothesis is therefore that time series of all individual regions have a unit root.  
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18 Results are presented in Table 6.  
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24 [Insert Table 6]  
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29 Panel unit root tests support the hypothesis of a unit root for most variables in level.  
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31 However the null hypothesis is rejected with the IPS test for bank office density at the 1%  
32  
33 level. In first difference, unit root tests show that all variables are stationary.  
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### 38 3.2 Long run cointegration analysis 39 40

41 As a second step, we conduct panel cointegration tests. To test for the presence of a  
42  
43 long run relationship between banking and economic development, we use the methodology  
44  
45 suggested by Pedroni, 1999 and 2004. This procedure is based on Engle-Granger, 1987, two-  
46  
47 step cointegration tests. Pedroni proposed eleven statistics that allow for heterogeneous  
48  
49 intercepts and trend coefficients across cross sections. Two alternatives classes of statistics are  
50  
51 tested: the first one is based on the within dimension of the panel while the second one is  
52  
53 based on the between dimension of the panel. According to Pedroni, 2004, for very small  
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55 value of T (time dimension) and a limited number of individuals, the Phillips-Perron (PP)  
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3 statistic performs relatively better than the others. Therefore we rely on this statistic to test the  
4  
5 null hypothesis of no cointegration.  
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10 Since the direction of the relationship between economic and banking regional  
11 development is not clear, we perform cointegration tests on the two following models:  
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$$14 \quad PC\_RGRDP_t = \alpha + \beta BD_t + \gamma RBMS_t + \varepsilon_t \quad (1)$$

$$15 \quad BD_t = \alpha + \beta PC\_RGRDP_t + \gamma RBMS_t + \varepsilon_t \quad (2)$$

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21 where  $PC\_RGRDP_t$  is per capita real gross regional domestic product,  $BD_t$  is a measure of  
22 banking development and  $RBMS_t$  a measure of rural bank market share. According to  
23  
24 Christopoulos and Tsionas, 2004, the results of the cointegration analysis undertaken on the  
25  
26 two models can give an insight on the long-run causality between the two variables banking  
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28 development and regional development.  
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36 In equation (1), cointegration tests are performed using as explanatory variables (i)  
37 alternatively one of the three I(1) measure for banking development,<sup>8</sup> and (ii) alternatively  
38  
39 one of the two I(1) measures for rural banks market share (RB Loan share or RB Resource  
40  
41 share).  
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46 In equation (2), cointegration tests are performed using as the explained variable  
47 alternatively one of the three I(1) measures for banking development (BD) and as explanatory  
48  
49 variables (i) the per capita real gross regional domestic product (PC\_RGRDP) and (ii)  
50  
51 alternatively one of the two I(1) measures for rural banks market share (RB Loan share or RB  
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53 Resource share). Test results for equation (1) and equation (2) are respectively shown in tables  
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55 A1 and A2, Appendix I.  
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When per capita real gross regional domestic product is used as the dependent variable (equation (1)), the null hypothesis of no cointegration is rejected for the whole sample and for the sub-samples “Intermediate developed regions” and “Less developed regions”. Therefore results show that in the long run regional banking development affects regional economic development. However, when banking development is used as the dependent variable (equation (2)), the null hypothesis is only rejected once for all samples when deposits are used to build the financial depth measure,<sup>9</sup> and in this case the equation might reflect a money demand based on transactions motive. Overall the results shows that the long run relationship between economic and banking regional development is from banking development to economic development.<sup>10</sup> Therefore the analysis of the relationship between economic development, banking development and the role of rural banks will be focused on equation (1), using the RB Loan share variable which allow us to study the sample “All regions” and the three sub-samples “All regions except NCR”, “Intermediate developed regions” and “Less developed regions”.

The estimation of the long run relationship is performed using alternatively three different estimators: ordinary least squares (OLS), fully-modified least squares (FMOLS) initially proposed by Phillips and Hansen, 1990, and the dynamic least squares (DOLS) of Saikkonen, 1991, and Stock and Watson, 1993. We first use the OLS estimator. But, as underlined by Kao and Chiang, 2000, this estimator suffers from a non-negligible bias in finite samples. We then use the FMOLS estimator as suggested by Pedroni,1996, which performs better than the OLS estimator for small samples as in our case. Moreover, as shown in Pedroni, 2000, the FMOLS methodology addresses the problem of endogeneity of the regressors. Kao and Chiang, 2000, find from Monte-Carlo simulations that the DOLS

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3 estimator over-performs the FMOLS and OLS estimators in estimating cointegrated panel  
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5 regressions, therefore, we also present results using the DOLS methodology.  
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10 Table 7 displays the long run relationship between economic, banking development and  
11 the presence of rural banks, measured by the RB Loan share, for the four samples of regions  
12 for which the Pedroni test is conclusive.<sup>11</sup>  
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15 [Insert Table 7]  
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20 The results lead to two main outcomes.  
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24 First, we cannot clearly identify a consistent impact of banking development variables  
25 on regional economic development. Depending on the proxies, the samples and the  
26 methodologies, the coefficient of the banking development variable can be either positive or  
27 negative, and either significant or not. While analyzing the impact of banking development on  
28 economic development, OLS estimations show opposite results depending on the proxy  
29 retained. Financial depth when measured as the ratio of total net loans on the nominal regional  
30 gross domestic product (Loans variable) has a negative impact on economic development for  
31 the sample “All regions” and the sub-sample “Less developed regions” and not significant for  
32 the two other sub-samples. The literature has often pointed out that variables such as loans  
33 have an ambiguous status. They are good measure of the size of the financial sector and could  
34 also well predict banking crisis. Indeed we might explained this result by a strong decrease in  
35 the level of loans granted by commercial banks following the Asian crisis, whereas the  
36 economic activity recovered more rapidly (Podpiera and Singh, 2007). This negative link  
37 between financial depth and economic development when data set includes 1997-1998 Asian  
38 crisis is in line with the finding of Rousseau and Wachtel, 2005. Unfortunately, given the  
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3 availability of the data, it was not possible to work on a period excluding the Asian crisis. The  
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5 role of commercial banks is of main importance for the country because of their strong  
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7 presence especially in the wealthy regions. This negative link holds for three out of the four  
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9 samples if we use the Local intermediation variable instead of the Loans variable. However,  
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11 when we use the ratio of total deposits on the nominal regional gross domestic product  
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13 (Deposits variable), we find a positive and significant impact of financial depth on economic  
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15 development for three out of the four samples. Using the FMOLS estimation procedure leads  
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17 mainly to the same overall explanation of the results even if the results don't tally for each  
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19 sample and the significance of the coefficients is slightly stronger for the Local intermediation  
20  
21 variable. However if we consider the coefficients obtained with the DOLS methodology, the  
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23 link between banking development and economic development collapses. This finding of the  
24  
25 sensitivity of the results to the econometric methodology used has been highlighted by a  
26  
27 number of studies such as Favara, 2003, and Dufrénot et al., 2007, and is often explained by  
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29 the difficulty to specify correctly the origin of non-stationary variables. An answer could be  
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31 the use of common factor models such as the PANIC methodology (Panel Analysis of Non-  
32  
33 stationarity in Idiosyncratic and Common Components) proposed by Bai and Ng, 2004.  
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35 Unfortunately, the sample does not able us to use this technique as it requires a large time and  
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37 individual dimension panels.  
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46 Second, a very interesting finding is the positive and always significant except once  
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48 impact of the presence of rural banks on economic development whatever the proxies, the  
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50 samples and the methodologies used. We show for all samples studied that rural bank  
51  
52 presence affects positively the economic activity even for the sample "All regions" for which  
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54 we obtained a negative relationship from Spearman rank-order tests.<sup>12</sup> The results are robust  
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56 to the econometric estimators used: OLS, FMOLS and DOLS estimation procedures give  
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58 mostly the same results. However in the case of the sample "All regions", using the FMOLS  
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3 estimators we find an abnormal high value for the coefficient of the rural bank variable  
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5 whatever the proxy used for banking development. This result could be explained by  
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7 specificities of the National Capital Region (where the presence of rural banks is negligible)  
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9 as we do no longer find such coefficient for the sub-sample “All regions except NCR”.  
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11 Results also show that the impact of rural banks on economic development for the  
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13 intermediate developed regions is usually stronger than for the less developed regions and  
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15 than the average effect of rural banks on economic development. It might suggest that a  
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17 threshold exists. Threshold effects are also found in the literature of cross-countries growth  
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19 finance nexus, built on country ranking using ex-ante economic or financial development  
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21 criteria (see Dermirgüç-Kunt and Levine, 2008; Kendal, 2009; Rioja and Valev, 2004a and  
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23 2004b). For example, on the one hand, Rioja and Valev, 2004a find that the positive effect of  
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25 financial development on economic growth varies according to the level of financial  
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27 development. They divided their panel of 74 countries in three groups. In the “low region”  
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29 (countries with very low levels of financial development), there is not a clear-cut effect of  
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31 financial sector expansion on economic growth. However financial development has a large  
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33 and positive effect on growth in the “intermediate region” but this effect, if still positive, is  
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35 smaller in the “high region”. On the other hand, the same authors (Rioja and Valev, 2004b)  
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37 show in another study the existence of a threshold effect of financial development on  
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39 economic development, ranking the same sample of 74 countries in three different groups,  
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41 “low-income”, “middle-income” and “high-income”, according to the level of per capital real  
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43 domestic product. Under the threshold, finance affects economic development mainly through  
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45 capital accumulation. Above, economic development is enhanced not only by capital  
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47 accumulation but also through productivity growth. Thus this positive impact of financial  
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49 development is all the more important that the country has a high level of per capita GDP.  
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51 This work show that in a low-income country where overall the link finance-growth is weaker,  
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3 a minimum of economic development is required for an effective impact of financial  
4 institutions dedicated to low-income households and micro-entrepreneurs. Our empirical  
5 investigation is in line with this later paper using an economic development criterion, but  
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12 We underline the existence of a poverty trap in the Philippines. In other words, a minimum  
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15 level of economic development is required for the influence of rural banks on economic  
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18 activity to be more effective.  
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### 22 3.3.3 Robustness check

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24 Regarding the limited number of cross-sections units of some of our sub-samples, we  
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27 conduct our estimation on rolling samples to check the robustness of our results. We exclude  
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29 NCR because of its atypical characteristics highlighted previously. We therefore use as initial  
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31 sample “All regions less NCR”, named S15, from which we remove the poorest region,  
32  
33 ARMM (according to the 1993 ranking<sup>13</sup>) to obtain the sample S14. The sample S13 is then  
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35 built by taking S14 and removing the poorest region, Bicol, and so on up until the S8 sample  
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37  
38 which include the six intermediate regions and the two developed regions other than NCR. As  
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41 a preliminary step, we test for cointegration on the seven newly built sub-samples using the  
42  
43 three indicators of banking development and two indicators of rural banks presence. The  
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45 results are provided in Table A4 in Appendix III. The null hypothesis of no cointegration is  
46  
47 always rejected for RB Loan share.<sup>14</sup> We then perform long run estimations for this indicator  
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50 using the three methods, OLS, FMOLS and DOLS. Table 8 gives the results.  
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53 [Insert Table 8]  
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58 As for the estimation on separated sub-samples, we do not find a clear evidence of a  
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60 positive impact of banking development on regional economic development. However, the

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3 estimation on rolling sub-samples confirms the differentiated effects of rural bank presence  
4 depending on the level of economic development. Over the 81 coefficients estimated on the  
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6 nine sub-samples, the three indicators of banking development and the three econometric  
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8 methods, all of rural banks market share coefficients are positive and significant at the 1%  
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10 level except 4 at the 5% and 2 at the 10% levels. The most interesting result is the increased  
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12 value for the rural bank presence coefficient as the poorest regions are successively excluded  
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14 in the rolling sub-samples.  
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22 [Insert Figure 2]  
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27 Figure 2 presents the coefficients of RB Loan share depending on the three  
28 econometric methods and for to the three banking indicators. In quite all case, we observe a  
29 positive weak slope from S15 to S10, i.e. when we successively remove the poorest regions of  
30 the Less developed regions sample, and a steeper slope (with OLS and DOLS) from S10 to S8  
31 i.e. when the sub-samples included the two developed regions except NCR, the intermediate  
32 developed regions and the two most developed regions among the poorest. This result, in line  
33 with the ones obtained above, shows a stronger impact of rural banking for higher level of  
34 economic development. Moreover, the steeper slope confirms the existence of the threshold  
35 effect as suggested in Table 7 between the less developed regions and the intermediate ones,  
36 which could now be more precisely identified between the seven poorest regions and the  
37 others Philippine regions.  
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53 We therefore confirm a financial-fostering hypothesis as we find a positive effect of  
54 rural banking on economic development but we show that the intensity of this financial-led  
55 relationship is real-development dependent.  
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#### Section 4. Conclusion

This paper aims to contribute to the finance/growth literature by analyzing the specific effect of local banks on regional economic performance. More precisely it focuses on the influence of rural banks, which are mainly dedicated to foster expansion of rural areas, on economic development in the sixteen regions of the Philippines. The regional market analysis undertaken in this paper relies on regional balance sheet data for the three types of Philippine banks even those from nationwide banks, which are usually confidential information.<sup>15</sup>

When examining the relationship between banking and economic development using traditional indicators built at the regional banking industry level, there is not a strong evidence of a banking-led economic development. But, if we focus on the specific effect of rural banks presence, a positive impact is found on economic development for the intermediate and less developed regions, with a stronger impact for intermediate regions. We analyze this result, confirmed by our estimations on rolling sub-samples, as the existence of threshold effect that is a minimum level of yield per capita is required for rural bank influence to be more effective.

The Philippines experience shows that the presence of rural banks, which have an expertise in financing micro-entrepreneurs and poor households, should be supported in order to stimulate economic activity especially in the rural areas of developing countries. The results suggest a comparative advantage of rural banking in building a closer relationship in the lending segment of the market favoring therefore the financing of projects that commercial banks would not have done.

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#### 17 Appendix I

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19 [Insert Table A1 and Table A2]  
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#### 24 Appendix II

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26 [Insert Table A3]  
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#### 31 Appendix III

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33 [Insert Table A4]  
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Table 1. Per Capita Real Gross Regional Domestic Product: Summary statistics and ranking indicators (1993-2005)

	1993	1993 Rank	2005	2005 Rank
Developed regions				
NCR	879	1	1452	1
Northern Mindanao	516	2	619	2
CAR	373	3	585	3
Intermediate developed regions				
Socksargen	293	8	481	4
Central Visayas	320	6	432	5
South Luzon	368	4	418	6
Western Visayas	287	9	416	7
Central Luzon	313	7	357	8
Davao	352	5	310	9
Less developed regions				
Zamboanga Peninsula	258	10	280	10
Eastern Visayas	192	12	258	11
Ilocos	181	14	257	12
Cagayan Valley	187	13	240	13
Caraga*	209	11	223	14
Bicol	178	15	210	15
ARMM	111	16	125	16
Mean	344		468	
Mean excluding NCR	312		410	
Median	290		333	
Median excluding NCR	287		310	

Source: National Statistical Coordination Board; \*Caraga figure corresponds to 1997. Real gross regional domestic product is expressed in thousands of pesos at 1990 prices. PC\_RGDRP = Real GRDP/Regional Population. Real GDRP equals to the nominal GDRP deflated by the consumer price index. Three population census (1990, 1995 and 2000) and the linear interpolation or extrapolation methods are used to obtain the annual figures.

Table 2. Descriptive statistics (Average value of the variables over the 1993-2005 period)

	Total deposits*	Total net loans*	Intermediation	PC_RGRDP	Deposits	Loans	Banking office density	RB Resource share	RB Loan share	RB office density
DEVELOPED REGIONS										
NCR	1 299 034	1 274 290	0.99	1.13	1.19	1.19	0.24	0.11%	0.18%	2.14%
Northern Mindanao	22 226	15 989	0.82	0.52	0.16	0.13	0.08	7.21%	9.55%	34.99%
CAR	16 754	4 470	0.26	0.51	0.24	0.06	0.07	5.36%	17.28%	36.28%
Mean	446 005	431 583	0.69	0.72	0.53	0.46	0.13	0.23%	0.37%	27.47%
Standard deviation	738 750	729 828	0.38	0.36	0.57	0.63	0.10	0.04	0.09	0.16
INTERMEDIATE DEVELOPED REGIONS										
Socksargen	10 579	4 778	0.54	0.35	0.10	0.05	0.04	9.56%	14.68%	40.50%
Central Visayas	90 404	43 462	0.56	0.38	0.41	0.23	0.08	3.58%	4.68%	26.52%
South Luzon	120 274	38 084	0.37	0.39	0.26	0.09	0.10	13.05%	24.92%	38.93%
Western Visayas	50 817	19 782	0.47	0.34	0.24	0.11	0.06	5.39%	10.30%	32.42%
Central Luzon	84 780	33 918	0.46	0.33	0.33	0.14	0.09	10.95%	17.27%	36.95%
Davao	38 855	23 996	0.67	0.35	0.23	0.15	0.06	5.88%	7.33%	30.47%
Mean	65 952	27 337	0.51	0.36	0.26	0.13	0.07	8.85%	13.46%	34.30%
Standard deviation	39 831	14 113	0.10	0.02	0.10	0.06	0.02	0.04	0.07	0.05
LESS DEVELOPED REGIONS										
Zamboanga Peninsula	17 158	5 508	0.36	0.26	0.22	0.08	0.03	4.13%	11.15%	23.53%
Eastern Visayas	13 694	4 449	0.36	0.22	0.17	0.06	0.03	6.44%	12.95%	39.47%
Ilocos	37 820	11 922	0.38	0.23	0.38	0.14	0.08	12.84%	26.96%	49.74%
Cagayan Valley	15 529	8 779	0.64	0.23	0.24	0.15	0.07	16.40%	20.73%	57.75%
Caraga	8 954	4 395	0.51	0.22	0.19	0.09	0.04	18.98%	26.47%	53.29%
Bicol	19 403	9 183	0.51	0.19	0.22	0.11	0.04	12.72%	20.79%	42.53%
ARMM	4 568	1 315	0.31	0.13	0.21	0.06	0.02	2.75%	8.50%	23.57%
Mean	16 732	6 507	0.44	0.21	0.23	0.10	0.05	12%	21.22%	41.01%
Standard deviation	10 576	3 612	0.12	0.04	0.07	0.04	0.02	0.06	0.07	0.13
ALL REGIONS EXCEPT NCR										
Mean	115 678	94 020	0.51	0.36	0.30	0.18	0.07	8.45%	14.60%	37.56%
Standard deviation	317 366	315 014	0.194	0.23	0.25	0.27	0.05	0.05	0.08	0.10
ALL REGIONS										
Mean	36 788	15 335	0.48	0.31	0.24	0.11	0.06	1.55%	2.34%	35.31%
Standard deviation	34 985	13 634	0.15	0.11	0.08	0.047	0.02	0.05	0.07	0.13

Loans: total net loans/nominal regional gross domestic product, Deposits: total deposits/regional gross domestic product, Banking office density: number of banking offices per capita, Intermediation: total net loans/total deposits, RB Loan share: net loans of rural banks per region/total net loans per region, RB Resource share: total resources of rural banks per region/total resources per region.\* In millions of pesos. Source: Bangko Sentral ng Pilipinas; National Statistical Coordination Board.



Table 3. Market share per type of banks in the Philippines 1993-2005

	Commercial banks	Thrift banks	Rural Banks
Banking office density	56.81 %	17.81 %	25.37 %
	45.45 %	16.96 %	37.60 %
Total resources	90.67 %	7.77 %	1.55 %
	79.07 %	12.05 %	8.88 %
Total net loans	89.13 %	8.52 %	2.34 %
	73.12 %	12.44 %	14.44 %

The second number presented in each cell is the market share computed for the group "All regions except NCR", Source: Bangko Sentral ng Pilipinas

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Table 4. Rural banks market share per region

	1993						2005					
	RB resource share <sup>1</sup>	Rank	RB loan share <sup>2</sup>	Rank	RB office density <sup>3</sup>	Rank	RB resource share	Rank	RB loan share	Rank	RB office density	Rank
DEVELOPED REGIONS												
NCR	0.05%	16	0.07%	16	1.21%	16	0.21%	16	0.53%	16	2.61%	16
Northern Mindanao	4.92%	11	5.96%	14	31.38%	13	10.37%	7	18.29%	11	43.31%	4
CAR	4.01%	12	14.08%	4	40%	7	7.94%	10	34.94%	5	38.18%	10
INTERMEDIATE DEVELOPED REGIONS												
Socksargen	9.18%	5	12.72%	6	41.54%	6	10.01%	8	20.34%	10	39.18%	8
Central Visayas	3.92%	13	4.88%	15	31.46%	12	5.20%	15	8.82%	15	26.59%	14
South Luzon	11.25%	2	18.01%	2	38.55%	8	13.50%	5	37.74%	3	39.82%	7
Western Visayas	5.23%	9	8.06%	10	37.06%	9	6.43%	13	16.85%	12	33.18%	12
Central Luzon	8.44%	6	12.54%	7	32.77%	11	14.30%	4	26.59%	7	41.32%	5
Davao	5.22%	10	6.44%	13	29.86%	14	8.97%	9	15.37%	14	33.60%	11
LESS DEVELOPED REGIONS												
Zamboanga Peninsula	2.87%	14	6.98%	11	24.39%	15	7.08%	12	22.87%	9	29.91%	13
Eastern Visayas	5.67%	8	12.45%	8	42.71%	5	7.40%	11	16.66%	13	39.10%	9
Ilocos	12.90%	1	26.82%	1	51.36%	2	13.21%	6	38.16%	2	50.92%	3
Cagayan Valley	10.58%	3	13.15%	5	53.03%	1	19.25%	2	30.90%	6	63.39%	1
Caraga <sup>4</sup>	10.22%	4	16.51%	3	47.94%	3	23.20%	1	45.10%	1	61.40%	2
Bicol	6.61%	7	11.24%	9	45.51%	4	17.26%	3	35.39%	4	39.91%	6
ARMM	2.62%	15	6.75%	12	36.96%	10	6.11%	14	25.56%	8	19.23%	15

<sup>1</sup> Share of total resources of rural banks over total resources of all types of banks<sup>2</sup> Share of net loans granted by rural banks over total net loans granted ; <sup>3</sup> Number bank offices for of rural banks over total number of bank offices; <sup>4</sup>CARAGA figure corresponds to 1996. Source: Bangko Sentral ng Pilipinas.

Table 5. Correlation Analysis: Spearman rank-order with PC\_RGRDP as referent variable

	All regions	All regions except NCR	Developed regions	Intermediate developed regions	Less developed regions
<u>Banking Development (BD)</u>					
Financial depth					
- Loans	0.233***	0.066	0.841***	-0.824	0.043
- Deposits	0.244***	0.072	0.884***	0.247**	0.246**
- Banking office density	0.652***	0.576***	0.948***	0.314***	0.358***
Local intermediation					
- Intermediation	0.181***	0.011	0.485***	-0.397***	0.110
<u>Rural banks market share (RBMS)</u>					
- RB Loan share	-0.261***	-0.103	-0.489***	0.297***	0.284***
- RB Resource share	-0.380***	-0.134*	-0.653***	0.080	0.313***

(\*\*\*), (\*\*) and (\*) signify rejection of the null hypothesis of absence of rank-order correlation at the 1%, 5% and 10% levels respectively.

Table 6. Im, Pesaran and Shin (IPS) panel unit root tests

	Variable in level	Variable in first difference
PC_RGDRP	2.77	-3.86***
<u>Banking development (BD)</u>		
Financial depth		
- Loans	0.25	-2.75***
- Deposits	-1.48	-3.11***
- Banking office density	-2.83***	
Local intermediation		
- Intermediation	0.91	-2.67***
<u>Rural banks market share (RBMS)</u>		
- RB Loan share	6.37	-2.04***
- RB Resource share	1.93	-2.69***

(\*\*\*), (\*\*) and (\*) signify rejection of the null hypothesis of presence of unit root at the 1%, 5% and 10% levels respectively.

Table 7. Long run relationship between economic development, banking development (BD) and the role of rural banks (RB)<sup>1</sup> using OLS, FMOLS and DOLS estimators

BD:	Financial depth: Loans			Financial depth: Deposits			Local intermediation		
	OLS	FMOLS	DOLS	OLS	FMOLS	DOLS	OLS	FMOLS	DOLS
All regions ( $N_1 = 204$ ; $N_2 = 16$ ; $T = 13$ )									
BD	-0.20***	-0.02	0.01	-0.06	0.12	-0.18*	-0.06*	-0.04**	-0.01
RB	0.18***	8.18***	0.30***	0.28***	8.55***	0.53***	0.14*	7.30***	0.25**
All regions except NCR ( $N_1 = 195$ ; $N_2 = 15$ ; $T = 13$ )									
BD	-0.05	-0.21*	0.01	0.17*	0.12	0.03	-0.04*	-0.02**	-0.08
RB	0.23***	0.31***	0.33***	0.22***	0.32***	0.44***	0.18***	0.23***	0.20*
Intermediate developed regions ( $N_1 = 78$ ; $N_2 = 6$ ; $T = 13$ )									
BD	-0.02	-0.56*	-0.01	0.25*	0.30***	0.34**	-0.05	-0.62***	-0.25**
RB	0.40***	0.40***	0.41***	0.32***	0.43***	0.52***	0.27**	1.35***	-0.016
Less developed regions ( $N_1 = 91$ ; $N_2 = 7$ ; $T = 13$ )									
BD	-0.15**	-0.15	-0.09	0.10*	-0.04***	0.10	-0.05***	-0.03	-0.03
RB	0.08***	0.11***	0.12***	0.09***	0.11***	0.10**	0.05*	0.09***	0.11***

(\*\*\*), (\*\*) and (\*) indicate significance at the 1%, 5% and 10% levels respectively. <sup>1</sup> The role of rural banks is measured by the variable RB Loan share.  $N_1$  and  $N_2$  are respectively the total number of observations and the number of cross-section units and T is the number of time observations.

Table 8. Long run relationship between economic development, banking development (BD) and the role of rural banks (RB)<sup>1</sup> using OLS, FMOLS and DOLS estimators on Ranking reference 1993

BD:	Financial depth: Loans			Financial depth: Deposits			Local intermediation		
	OLS	FMOLS	DOLS	OLS	FMOLS	DOLS	OLS	FMOLS	DOLS
All regions (N <sub>1</sub> = 204; N <sub>2</sub> = 16; T =13)									
BD	-0.20***	-0.02	0.01	-0.06	0.12	-0.18*	-0.06*	-0.04**	-0.01
RB	0.18***	8.18***	0.30***	0.28***	8.55***	0.53***	0.14*	7.30***	0.25**
All regions except NCR, S15 (N <sub>1</sub> = 195; N <sub>2</sub> = 15; T =13)									
BD	-0.05	-0.21*	0.01	0.17*	0.12	0.03	-0.04*	-0.02**	-0.08
RB	0.23***	0.31***	0.33***	0.22***	0.32***	0.44***	0.18***	0.23***	0.20*
S14, S14 = S15 less ARMM (N <sub>1</sub> =178; N <sub>2</sub> = 14; T =13)									
BD	-0.04	0.22**	0.09	0.18*	0.16**	0.187	-0.03	-0.03**	-0.029
RB	0.25***	0.33***	0.405***	0.216***	0.36***	0.355***	0.20***	0.25***	0.29**
S13, S13 = S14 less Bicol (N <sub>1</sub> = 165; N <sub>2</sub> = 13; T =13)									
BD	-0.036	0.24**	0.12	0.18*	0.18**	0.17	-0.03	-0.03***	-0.02
RB	0.27***	0.34***	0.454***	0.23***	0.37***	0.40***	0.22***	0.26***	0.33**
S12, S12 = S13 less Ilocos (N <sub>1</sub> = 152; N <sub>2</sub> = 12; T =13)									
BD	-0.03	0.27*	0.12	0.23*	0.19**	0.37	-0.03	-0.03***	-0.02
RB	0.29***	0.37***	0.48***	0.24***	0.39***	0.37***	0.24***	0.27***	0.35**
S11, S11 = S12 less Cagayan Valley (N <sub>1</sub> = 139; N <sub>2</sub> = 11; T =13)									
BD	-0.016	0.31	0.118	0.25*	0.20**	0.39	-0.028	-0.03**	-0.029
RB	0.30***	0.39***	0.50***	0.256***	0.41***	0.396***	0.257***	0.30***	0.356***
S10, S10 = S11 less Eastern Visayas (N <sub>1</sub> = 126; N <sub>2</sub> = 10; T =13)									
BD	-0.014	-0.41	0.122	0.245*	0.13**	0.397	-0.027	-0.02*	-0.028
RB	0.304***	0.41***	0.504***	0.256***	0.45***	0.396***	0.257***	0.31***	0.357**
S9, S9 = S10 less Caraga (N <sub>1</sub> = 117; N <sub>2</sub> = 9; T =13)									
BD	0.085	0.48	0.252	0.22	0.19**	0.344	-0.0002	-0.01	0.015
RB	0.44***	0.45***	0.707***	0.35***	0.48***	0.554***	0.40***	0.34***	0.604***
S8, S8 = S9 less Zamboanga Peninsula (N <sub>1</sub> = 104; N <sub>2</sub> = 8; T =13)									
BD	0.11	0.53	0.30	0.27*	0.25***	0.455*	0.004	-0.02*	0.025
RB	0.496***	0.48***	0.812***	0.383***	0.52***	0.60***	0.453***	0.35***	0.714***

(\*\*\*), (\*\*) and (\*) indicate significance at the 1%, 5% and 10% levels respectively. <sup>1</sup> The role of rural banks is measured by the variable RB Loan share. N<sub>1</sub> and N<sub>2</sub> are respectively the total number of observations and the number of cross-section units and T is the number of time observations.

Table A1. Pedroni panel cointegration test (Phillips-Perron statistic)

Dependent variable: PC_RGDRP		
	Rural bank market share	
	RB Loan share	RB Resource share
All regions ( $N_1 = 204$ ; $N_2 = 16$ ; $T = 13$ )		
Financial depth (Loans)	-3.80***	-2.10**
Financial depth (Deposits)	-5.98***	-3.22***
Local intermediation	-3.53***	-2.96***
All regions except NCR ( $N_1 = 195$ ; $N_2 = 15$ ; $T = 13$ )		
Financial depth (Loans)	-4.24***	-2.23**
Financial depth (Deposits)	-6.41***	-3.45***
Local intermediation	-3.86***	-3.19***
Developed regions ( $N_1 = 39$ ; $N_2 = 3$ ; $T = 13$ )		
Financial depth (Loans)	0.61	1.24
Financial depth (Deposits)	0.83	1.08
Local intermediation	1.33	1.30
Intermediate developed regions ( $N_1 = 78$ ; $N_2 = 6$ ; $T = 13$ )		
Financial depth (Loans)	-4.25***	-0.41
Financial depth (Deposits)	-7.48***	-1.76
Local intermediation	-3.45***	-0.34
Less developed regions ( $N_1 = 91$ ; $N_2 = 7$ ; $T = 13$ )		
Financial depth (Loans)	-2.61***	-3.77***
Financial depth (Deposits)	-2.66***	-3.95***
Local intermediation	-3.43***	-5.12***

(\*\*\*), (\*\*) and (\*) signify rejection of the null hypothesis of no cointegration at the 1%, 5% and 10% levels respectively.  $N_1$  and  $N_2$  are respectively the total number of observations and the number of cross-section units and T is the number of time observations.

Table A2. Pedroni panel cointegration test

Dependent variable: Loans		
	Rural bank market share	
	RB Loan share	RB Resource share
All regions ( $N_1 = 204$ ; $N_2 = 16$ ; $T = 13$ )		
Output per capita (PC_RGDRP)	-0.34	-0.48
All regions except NCR ( $N_1 = 195$ ; $N_2 = 15$ ; $T = 13$ )		
Output per capita (PC_RGDRP)	-0.47	-0.57
Developed regions ( $N_1 = 39$ ; $N_2 = 3$ ; $T = 13$ )		
Output per capita (PC_RGDRP)	-1.47*	-1.95**
Intermediate developed regions ( $N_1 = 78$ ; $N_2 = 6$ ; $T = 13$ )		
Output per capita (PC_RGDRP)	0.37	0.66
Less developed regions ( $N_1 = 91$ ; $N_2 = 7$ ; $T = 13$ )		
Output per capita (PC_RGDRP)	0.28	0.19
Dependent variable: Deposits		
	Rural bank market share	
	RB Loan share	RB Resource share
All regions ( $N_1 = 204$ ; $N_2 = 16$ ; $T = 13$ )		
Output per capita (PC_RGDRP)	-7.67***	-5.81***
All regions except NCR ( $N_1 = 195$ ; $N_2 = 15$ ; $T = 13$ )		
Output per capita (PC_RGDRP)	-8.00***	-6.17***
Developed regions ( $N_1 = 39$ ; $N_2 = 3$ ; $T = 13$ )		
Output per capita (PC_RGDRP)	-3.80***	-4.19***
Intermediate developed regions ( $N_1 = 78$ ; $N_2 = 6$ ; $T = 13$ )		
Output per capita (PC_RGDRP)	-3.13***	-3.76***
Less developed regions ( $N_1 = 91$ ; $N_2 = 7$ ; $T = 13$ )		
Output per capita (PC_RGDRP)	-4.07***	-1.63*
Dependent variable: Intermediation		
	Rural bank market share	
	RB Loan share	RB Resource share
All regions ( $N_1 = 204$ ; $N_2 = 16$ ; $T = 13$ )		
Output per capita (PC_RGDRP)	0.84	0.62
All regions except NCR ( $N_1 = 195$ ; $N_2 = 15$ ; $T = 13$ )		
Output per capita (PC_RGDRP)	-0.88	-0.70
Developed regions ( $N_1 = 39$ ; $N_2 = 3$ ; $T = 13$ )		
Output per capita (PC_RGDRP)	-0.58	-0.84
Intermediate developed regions ( $N_1 = 78$ ; $N_2 = 6$ ; $T = 13$ )		
Output per capita (PC_RGDRP)	1.68	1.28
Less developed regions ( $N_1 = 91$ ; $N_2 = 7$ ; $T = 13$ )		
Output per capita (PC_RGDRP)	0.30	0.50

(\*\*\*), (\*\*) and (\*) signify rejection of the null hypothesis of absence of long run relationship at the 1%, 5% and 10% levels respectively.  $N_1$  and  $N_2$  are respectively the total number of observations and the number of cross-section units and  $T$  is the number of time observations.



Table A3. Long run relationship between economic development, banking development (BD) and the role of rural banks (RB)<sup>1</sup> using OLS, FMOLS and DOLS estimators

BD:	Financial depth: Loans			Financial depth: Deposits			Local intermediation		
	OLS	FMOLS	DOLS	OLS	FMOLS	DOLS	OLS	FMOLS	DOLS
All regions ( $N_1 = 204$ ; $N_2 = 16$ ; $T = 13$ )									
BD	-0.24***	-0.14***	-0.28***	0.02	0.24***	0.06	-0.09***	-0.07***	-0.13**
RB	0.187	25.34***	0.35***	0.26	25.36***	0.45***	0.06	26.16***	0.08
All regions except NCR ( $N_1 = 195$ ; $N_2 = 15$ ; $T = 13$ )									
BD	-0.21***	-0.16***	-0.29***	0.33***	0.27***	0.18*	-0.07***	-0.06***	-0.18***
RB	0.19*	1.31***	0.31***	0.16	1.28***	0.37***	0.09	0.79***	0.02
Less developed regions ( $N_1 = 91$ ; $N_2 = 7$ ; $T = 13$ )									
BD	-0.23***	-0.23***	-0.22***	0.18***	-0.01	0.24***	-0.06***	-0.03***	-0.05***
RB	0.11***	0.50***	0.10	0.09**	0.83***	0.09	0.07*	0.56***	0.06

(\*\*\*), (\*\*) and (\*) indicate significance at the 1%, 5% and 10% levels respectively.<sup>1</sup> The role of rural banks is measured by the variable RB resource share.  $N_1$  and  $N_2$  are respectively the total number of observations and the number of cross-section units and T is the number of time observations.

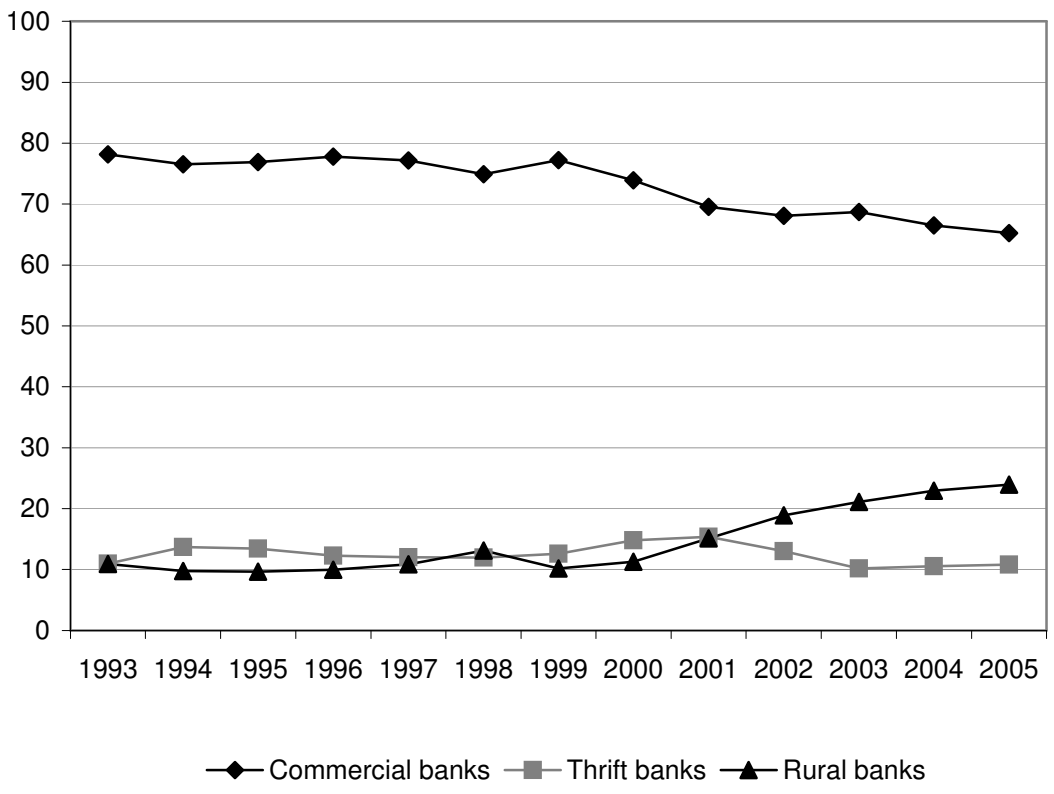
Table A4. Pedroni panel cointegration test (PP statistic), ranking 1993, on rolling samples

Dependent variable: PC_RGDRP		
	Rural bank market share	
	RB Loan share	RB Resource share
S14, S14 = S15 less ARMM ( $N_1 = 178$ ; $N_2 = 14$ ; $T = 13$ )		
Financial depth (Loans)	-4.08***	-1.98**
Financial depth (Deposits)	-6.73***	-3.51***
Local intermediation	-3.60***	-2.90***
S13, S13 = S14 less Bicol ( $N_1 = 165$ ; $N_2 = 13$ ; $T = 13$ )		
Financial depth (Loans)	-3.70***	-2.05**
Financial depth (Deposits)	-6.46***	-3.40***
Local intermediation	-3.06***	-2.98***
S12, S12 = S13 less Ilocos ( $N_1 = 152$ ; $N_2 = 12$ ; $T = 13$ )		
Financial depth (Loans)	-3.37***	-1.68**
Financial depth (Deposits)	-6.48***	-3.16***
Local intermediation	-2.76***	-2.51***
S11, S11 = S12 less Cagayan Valley ( $N_1 = 139$ ; $N_2 = 11$ ; $T = 13$ )		
Financial depth (Loans)	-3.18***	-1.16
Financial depth (Deposits)	-6.52***	-2.40***
Local intermediation	-2.42***	-1.98**
S10, S10 = S11 less Eastern Visayas ( $N_1 = 126$ ; $N_2 = 10$ ; $T = 13$ )		
Financial depth (Loans)	-3.32***	-0.28
Financial depth (Deposits)	-7.05***	-1.75**
Local intermediation	-2.60***	-1.09
S9, S9 = S10 less Caraga ( $N_1 = 117$ ; $N_2 = 9$ ; $T = 13$ )		
Financial depth (Loans)	-3.11***	0.60
Financial depth (Deposits)	-7.05***	-1.07
Local intermediation	-2.25***	0.56
S8, S8 = S9 less Zamboanga Peninsula ( $N_1 = 104$ ; $N_2 = 8$ ; $T = 13$ )		
Financial depth (Loans)	-3.36***	0.47
Financial depth (Deposits)	-6.29***	-0.97
Local intermediation	-2.08**	0.42

$N_1$  and  $N_2$  are respectively the total number of observations and the number of cross-section units and  $T$  is the number of time observations.

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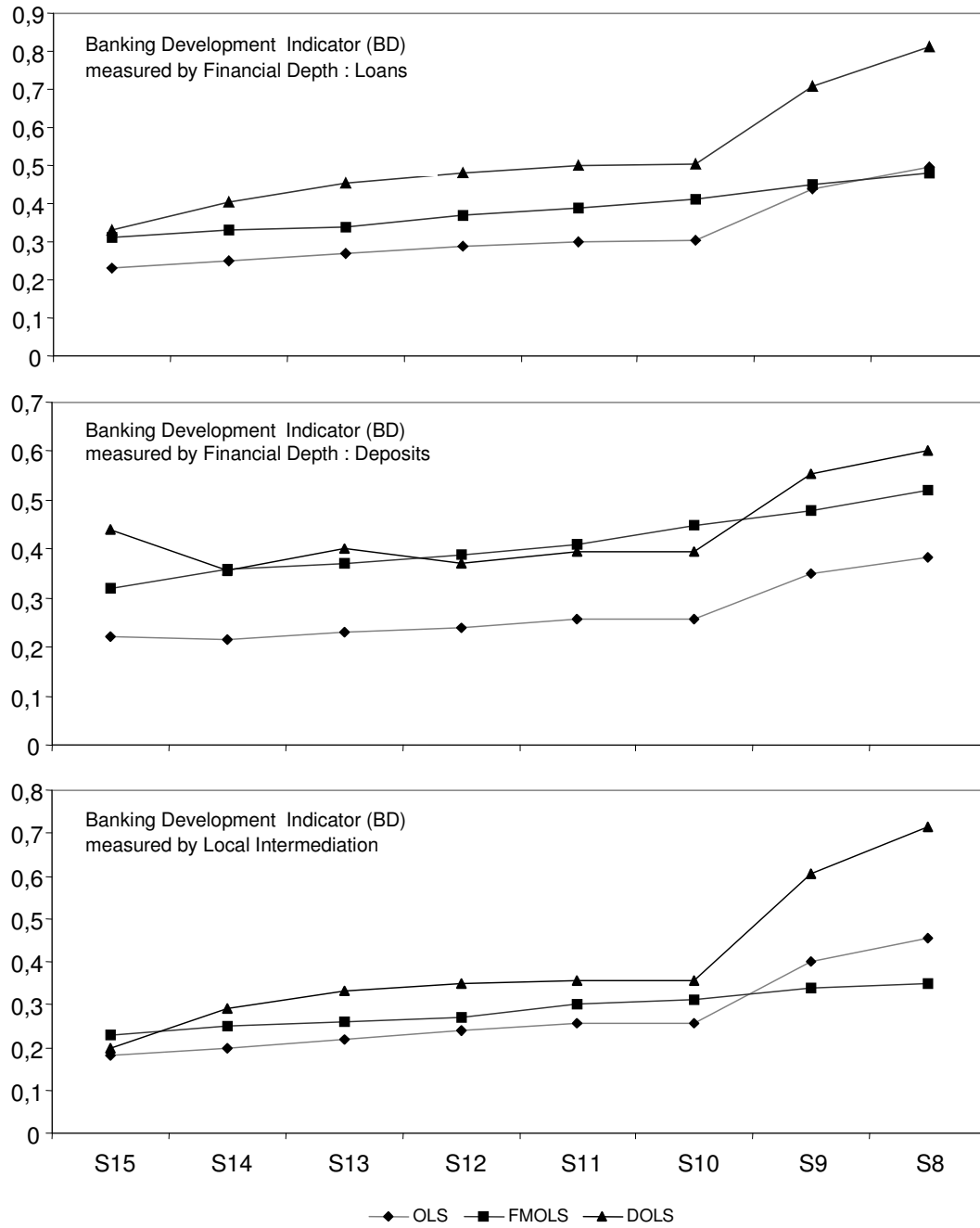
Figure 1. Loan market shares of commercial, thrift and rural banks in the Philippines (All regions except NCR)\* (1993-2005)



Source: Authors' calculation, Bangko Sentral ng Pilipinas

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Figure 2: Impact of rural bank market share on regional economic development in rolling sub-samples



S15 = All regions except NCR, S14 = S15 less ARMM, S13 = S14 less Ilocos S12 = S13 less Cagayan Valley, S11 = S12 less Eastern Visayas, S9 = S10 less Caraga, S8 = S9 less Zamboanga Peninsula

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7 <sup>1</sup> They mention, among others, the size, efficiency and regulation of the banking system or the laws and regulations that  
8 shape the operation of the financial system.

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10 <sup>2</sup> Berger et al., 2004, in a cross-country study also highlights such results.

11 <sup>3</sup> Hereafter, we used the term rural banks for rural and cooperative banks.

12 <sup>4</sup> For example, removing interest rate restrictions or easing new banks and branches opening.

13 <sup>5</sup> The sample includes the Asian crisis but we did not exclude it as we aim to study a long term relationship between  
14 banking and economic development.

15 <sup>6</sup> To measure the impact of rural banks on the economic development we will focus on loans variables rather than deposits  
16 as the purpose of the rural financial market as defined by policy reforms in the late 1980s is to provide credit access to small  
17 borrowers (Llanto, 2005).

18 <sup>7</sup> In this paper, we do not aim to study the semi-formal and informal financial sectors. For a presentation of the financial  
19 system in the Philippines, see Dauner Gardiol et al., 2005. For a detailed study of rural finance, see Llanto, 2005.

20 <sup>8</sup> Loans, Deposits or Local intermediation variables. The bank office density variable is  $I(0)$ . The statistic presented is the  
21 Phillips-Perron group statistic.

22 <sup>9</sup> The null hypothesis is also rejected for the developed regions when financial depth is proxied using loans.

23 <sup>10</sup> In order to analyze properly the causality, we would need to distinguish the short and long run causation. To do so, we  
24 need to build the error correction model and then to study the first difference lagged variables which would provide  
25 evidence on the direction of the short run causation while the significance of the error correction term provide evidence of  
26 the long run causation (Canning and Pedroni, 2008; Narayan et al., 2008). Unfortunately, we do not have enough time  
27 observations for such an analysis.

28 <sup>11</sup> We also estimate the long run equilibrium using the total resources market share of rural banks as a proxy of rural bank  
29 presence. The results found are mainly the same while a little less significant (Table A3 Appendix II).

30 <sup>12</sup> We remind the reader that the “Developed regions” sub-sample is not included because we do not find a cointegration  
31 relationship between the variables.

32 <sup>13</sup> We have followed the same procedure using the 2005 ranking. We obtained consistent results with the 1993 ranking.

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<sup>14</sup> We also performed the cointegration tests using RB Resource share as a proxy of rural bank presence. There is cointegration only for the sub-samples S14 to S11, which contain a significant number of less developed regions, group for which we found cointegration (Table A1, last column) while cointegration is rejected for the groups “Intermediate” and “Developed”.

<sup>15</sup> This information was obtained here thanks to the courtesy of the Central Bank of the Philippines.

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