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The technical efficiency of the Japanese banks: Non-radial directional performance measurement with undesirable output

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ABSTRACT

The paper analyses technical efficiency of the Japanese banks from 2000 to 2007. The estimation technique is based on the Russell directional distance function that takes into consideration not only desirable outputs but also an undesirable output that is represented by non-performing loans (NPLs). The results indicate that NPLs remain a significant burden as for banks' performance. We show that banks' inputs have to be utilised more efficiently, particularly labour and premises. We also argue that a further restructuring process is needed in the segment of Regional Banks. We conclude that the Japanese banking system is still far away from being fully consolidated and restructured.

1. Introduction

The aim of this study is to examine technical efficiency of the Japanese banking sector from 2000 to 2007. We apply a non-radial directional performance measurement that quantifies the impact of non-performing loans (NPLs) on bank efficiency. The inclusion of NPLs in the model is underpinned by recent empirical studies on the Japanese economy and its banking system. Fukao [1], Hoshi and Kashyap [2,3] among others unambiguously confirmed that the extent of NPLs in Japan have been at the centre of its lengthy banking crisis.

The Japanese banking system was brought almost at a standstill mainly due to credit misallocation in the late 1980s. A large volume of NPLs that had mounted on bank balance sheets were hidden by the Government in the early 1990s. Further, banks also concealed the true level of NPLs by accounting wizardry. The unsustainable volume of NPLs remained a dominant factor that has negatively influenced bank performance. Fukao [1,4] showed that the banking sector reported a negative operating profit from 1993 to 2002.

The contribution of this study to current empirical research on bank efficiency and the Japanese banking system are as follows: first, the applied methodological concept provides a comprehensive analysis of efficiency levels of the individual bank inputs/outputs and compare them with the estimated optimal levels. The decomposition of total technical efficiency into inputs and outputs is an important addition to the current research on bank efficiency. Second, we examine nexus between NPLs and bank efficiency. We apply the innovative methodological approach that makes possible to quantify the negative impact of NPLs on bank efficiency. Third, we analyse bank efficiency during the extensive bank consolidation process across different types of banks over the period 2000–2007. We then examine the impact of the restructuring programme on bank efficiency.

The methodology is based on an innovative non-parametric model introduced by Chen et al. [5], who showed that the non-radial model can compute efficiency inputs and outputs individually. That is not possible with the radial models since they are based on the assumption of proportional changes in inputs and outputs. The model is discussed in more details in Section 4.

The paper is organised as follows: Section 2 provides an overview of the Japanese banking system in the last two decades with the emphasis on the recapitalisation and consolidation process. Section 3 then summarises studies on efficiency in the Japanese banking sector and the methodological papers on efficiency with bad outputs. Section 4 presents the Data Envelopment Analysis (DEA) that is applied in this study. Section 5 discusses the data and empirical results. Section 6 provides summary of the results.

2. Bottlenecks of the Japanese banking sector

Banks play a pivotal role in the Japanese economy and the business relationship between banks and firms had been for decades very close. This relationship was further strengthened by a long

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Table 1
Number and types of Japanese banks.
Source: Bank Association in Japan.

	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007
City Banks	13	11	9	9	7	7	7	7	6	6
Regional Banks	64	64	64	64	64	64	64	64	64	64
Regional Banks II	68	65	60	57	56	53	50	48	47	46
Trust Banks[a]	16	23	33	31	29	27	27	26	23	21
Long-Term Credit Banks	3	3	3	3	3	2	2	1	1	0
Other banks[b]	–	–	–	1	5	5	6	9	9	10

[a] Including foreign-owned Trust Banks.
[b] Including the second bridge bank of Japan.

standing *keiretsu* arrangement. Fukao [1] argued that a close link between banks and firms was eroded by allowing large listed companies to be financed through corporate bonds. This erosion forced banks to look for other business opportunities since the most important clients – large companies – became less dependent on banks funding. Banks switched lending activities to the real estate sector since they were overconfident that bank collaterals in the form of real estate guarantee a sufficient cushion in the case of a negative credit event. Banks lending boom was further buoyant due to the loose monetary policy stance adopted by the Bank of Japan in the 1980s.

The unsustainable lending boom eventually burst in 1992 and caused long lasting problems for the Japanese economy and banking sector. The value of collaterals in the form of securities, buildings and lands plummeted in the early 1990s, when a large number of firms declared bankruptcy. Consequently, banks capital was rapidly depleted not only by old NPLs but also newly accumulated NPLs. The financial turmoil also squeezed the liquidity in the financial market since financial institutions preferred to deposit their money with the Bank of Japan instead of allocating it on an interbank market. This strategy dried up liquidity that pushed up interest rates, which even further deteriorated banks' financial position.

Table 1 shows the structure and number of Japanese banks operating from 1990 to 2008. The Japanese banking sector consists of the following groups of banks. Large banks that include City Banks, Long Term Credit Banks and Trust Banks.[3] City Banks and Long Term Credit Banks are typical large universal banks with an international exposure and they provide financial services to the large companies in Japan. Trust Banks also represent the segment of large Japanese banks. Trust Banks are particular type of banks within the Japanese financial market and provide conventional banking services but also combine financing services with asset management services. The second group of banks consists of Regional Banks I and the Second Association of Regional Banks. These banks are significantly smaller in terms of the asset size and market share if compared with City Banks. Regional Banks I are oriented on small and medium sized enterprises and retail banking at the regional level. These banks offer standard products. Tier II Regional Banks (Regional Banks II) are even smaller than Regional Banks but their business activities are similar to Regional Banks I. The third category of banks consists of mutual financial institutions that operate locally across forty seven prefectures.

The consolidation and recapitalisation process through mergers of financially distressed banks changed the structure of the banking sector. The number of City Banks halved since 1990. The number of Trust Banks was reduced by one third from the peak period in 2000. As for the group of small and medium-sized commercial banks, we may see that Regional Banks II also underwent a radical consolidation process. The financial crisis culminated in the second half of 1997, when seven banks were forced to go under financial administration and merged with other banks.

Table 2 (Panel A) depicts banks' profitability measured in terms of return on assets (ROA). We may observe that ROA remained weak and was close to zero at the beginning of the 2000s. The low profitability was caused due to the large volume of NPLs on banks' balance sheets. Banks' profitability marginally improved when these NPLs were eventually written-off. An increase in banks' profitability that we record in 2002 and 2003 was caused by the 're-arrangement' of NPLs in City Banks and Regional Banks I. A further scrutiny shows that City Banks reported almost double net profit comparing the previous period.

Thus, NPLs remained the main burden of the Japanese banking and authorities were reluctant to disclose the true picture about the accumulated NPLs almost for a decade. Table 2 (Panels B and C) shows the proportion of NPLs, the structure of the purchasing operations of bad loans and market share of individual groups of banks measured in terms of total credits. Table 2 further indicates that the NPL ratio peaked in 2002 at 8.7%. The nominal volume of NPLs was ¥28.3 trillion for the major Japanese banks in FY 2002. In March 2008, NPLs fell to ¥ 3.86 trillion and the ratio of total loans to NPLs was 1.4% in FY 2008. From Table 2, we also see that Regional Banks I and Regional Banks II showed the highest proportion of non-performing loans in the period 2000–2009. It is important to note that the volumes of NPLs reported by Regional Banks I and II are several times lower than those reported by large City Banks.

The Japanese banking system and particularly large banks were supported by unprecedented 'financial assistance' through Deposit Insurance Corporation of Japan (DICJ). The financial support in the form of direct capital injections and/or the purchase of bank assets from banks reached JPY 25.2 trillion over the period of FY 1992–2008. One hundred eighty one financial institutions received the financial support. DICJ allocated the largest proportion of financial aids of JPY 22.5 trillion in the period of 1998–2002. Nevertheless, this programme did not achieve its expectations and banks did not fully restore their activities.[4]

Banks only partially resolved their old NPL but they did not deal with newly created NPLs. The authorities tried to deal with the accumulated NPLs on banks' balance sheets but at the same time new NPLs occurred. This was mainly because of several factors; poor firms' performance, weak macroeconomic environment in which firms operated but also due to wrong and missing incentives that were given to commercial banks by the Government.

3. Literature review

In the following Section, we firstly review recent empirical studies on bank efficiency in Japan. In Section 3.2, we summarise the methodological studies on performance measurement with undesirable outputs in general.

[3] Trust Banks and Long Term Credit banks are special institutions and therefore we do not include them in our analysis. Long-Term Credit Banks then vanished from the system in 2007.

[4] Montgomery and Shimizutani [6] discussed the (in)effectiveness of recapitalisation policy of the Japanese banking sector.