Does the banking sector structure matter for credit procyclicality? ☆

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ABSTRACT

The aim of this paper is to investigate whether the banking sector structure matters in explaining credit procyclicality for 17 OECD countries over the 1986–2010 period. To this end, we first provide a detailed classification of the banking system structure through the use of a hierarchical clustering methodology. Relying on the estimation of panel VAR models and accounting for potential heterogeneity between countries, we then propose a measure of credit procyclicality based on the impulse-response function of credit to a shock in GDP. Our findings show that while credit significantly responds to shocks in GDP, the structure of the banking sector is not a key factor in assessing the procyclicality of credit for OECD countries.

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1. Introduction

Addressing procyclicality in bank lending behavior has become one of the priorities for banking regulators since the 2007–2008 financial crisis, as notably illustrated by the Basel 3 proposal which merges the more advanced regulatory tools in terms of implementation (BCBS, 2010, 2011). In particular, the Basel Committee on Banking Supervision (BCBS) proposes to introduce a countercyclical capital buffer. Upward adjustments in the capital buffer would be made during periods of excessive credit growth in order to curb the credit cycle and protect the banking sector from the accumulation of financial imbalances. In addition, the BCBS advocates a change in loan loss provisioning behaviors toward more forward-looking provisioning practices. These measures seek to increase the cost of making loans in terms of capital and loan loss provisions during the upward phase of the cycle. Indeed, it is largely accepted that both borrowers and lenders are overconfident during this phase about investment projects and their ability to repay and regain their loans. Banks' over optimism about borrowers' future prospects brings about more liberal credit policies with lower credit standards requirements. Thus, some negative net present value projects are financed just to find later the impairment of the loan or the default of the borrower (Jimenez and Saurina, 2006). On the other hand, during recessions, banks face non-performing loans and specific provisions that let them tighten further credit supply, complicating the prospects of a recovery in economic activity. These variations in lending are generally more than proportional to the changes in economic activity, suggesting that there are changes in bank loan supply that tend to accentuate the business cycle (Berger and Udell, 2004).

Regulatory tools included in the Basel 3 proposal act on banks' balance sheet to dampen the credit cycle. Some complementary measures could operate on borrowers, i.e. on credit demand (ECB, 2010). Imposing limits on loan-to-value (LTV) and/or loan-to-income (LTI) ratios in lending contracts during the upward phase of the cycle could cool down credit demand. These restrictions could concern only a specific sector or a specific type of loan depending on the sources of financial imbalances that are building-up in the economy. Furthermore, LTV and LTI ratios could be used to define capital surcharges and then also act on credit supply. For example, higher risk weights could be imposed on mortgage loans granted with higher LTV ratios when housing markets are booming. The implementation

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of these kinds of measures raises various challenges, including the regulatory tool calibration and the determination of trigger events. However, several countries, as for example South Korea and Hong Kong, already use LTV and LTI ratios for macroprudential regulation (Crowe et al., 2011a, 2011b).

As argued by Goodhart and Hofmann (2004), the liberalization of the financial sector has contributed to increasing the procyclicality of financial systems through the development of procyclical lending practices of banks. The historical experience tends to attach importance to this argument by showing that episodes of financial turbulence and crises have frequently been preceded by credit booming (Adalid and Detken, 2007; Borio and Lowe, 2004; Detken and Smets, 2004; Goodhart and Hofmann, 2008). However, the magnitude of credit procyclicality could differ depending on banking systems' characteristics such as size, competition or concentration. For instance, large banks could obtain a better diversification of their risks and then could be more resilient to shocks. In particular, Demsetz and Strahan (1997) show that large banks have more stable credit levels. Similarly, according to Petersen and Rajan (1995), the value of lending relationship is higher for banks with a greater market power. Banks that face a lower level of competition would have then more incentives to smooth credit access to their clients over the business cycle.[1]

Two important issues can be examined through the link between credit procyclicality and banking sector structure. First, one may investigate whether heterogeneous banking systems could expect the same stabilizing effects from regulatory tools addressing credit procyclicality. In other words, if credit is more procyclical in a specific banking sector, its regulators could have more incentives to promote an international regulation addressing procyclicality in bank lending behavior. Second, in a regulatory perspective, if the banking system structure affects how credit responds to the business cycle, regulators should also include this aspect in the design of banking regulation and not only focus on prudential measures.

In this paper, the relationship between credit procyclicality and the banking sector structure is investigated on a sample of 17 OECD countries over the 1986–2010 period. To this end, we first perform a clustering analysis to provide a classification of the banking system. We then rely on the estimation of a panel VAR (PVAR) model on cyclical components for each of the clusters and propose a measure of credit procyclicality based on the impulse-response function of credit to a shock in GDP.[2] This framework allows us to study whether credit procyclicality – i.e. the response of the credit market to a shock in GDP – depends on the structure of the banking sector.

Our paper contributes to the recent literature in several ways. First, we provide a rigorous classification of the banking system through the use of a hierarchical clustering methodology based on several indicators for our sample of OECD countries. This allows us to specifically account for heterogeneity among countries and to base our comparison between banking systems on multiple dimensions, classifying the countries according to similarities in the structure of their banking sector. Second, relying on a PVAR framework, we add to the discussion on how to measure credit procyclicality of the banking system. Finally, we contribute to the literature on the banking system regulation by investigating the determinants that are at play in the procyclical character of credit.

The rest of the paper is organized as follows. Section 2 assesses similarities in banking sector structures through the use of a hierarchical clustering approach. Section 3 deals with the PVAR modeling and reports the estimation results for the different clusters, together with the impulse-response functions. Section 4 provides some concluding remarks.

2. Assessing similarities in banking sector structures

We consider the following sample of 17 OECD countries: Australia, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, United Kingdom, and the United States.[3]

These 17 countries are split up into several clusters according to their banking system structure. Providing homogenous clusters is a complex task due to peculiar features in each banking system. We jointly consider several indicators to mitigate this issue and then to get consistent clusters. More precisely, we implement a hierarchical agglomerative clustering (HAC) combined with a partitional clustering (Husson et al., 2010, 2011; Lê et al., 2008) to account for similarities/dissimilarities in banking system structures evaluated on a set of variables. The PVAR models will be then estimated at the cluster level.

2.1. Clustering methodology

The HAC, based on an agglomerative algorithm, permits to build a hierarchy from individuals. In our case, individuals are countries characterized by their banking system structure. At the beginning, each country is considered as a separate cluster. The agglomerative algorithm progressively merges clusters according to their similarities, the latter being evaluated on multiple dimensions, i.e. on a set of variables. In each step, the pair of clusters with the lowest dissimilarities is merged into a single cluster.

We rely on seven variables to evaluate the degree of similarity in the banking system structures. More precisely, we account for concentration, ownership, restrictions in activities, and size of the banking sector. In addition, we distinguish between market-based and bank-based financial systems. The seven variables are the following[4]:

- $C3$: a concentration index given by the assets of the three largest banks as a share of assets of all commercial banks,
- HHI: the Herfindahl–Hirschman index, defined as the sum of squared market shares,
- BC: total assets of commercial banks as a share of total assets of the banking system,
- $Rest$: a measure of a bank's restrictions to engage in securities markets, insurance and real estate activities,
- $Size^{GDP}$: private credit to GDP ratio,
- Cap: stock market capitalization to domestic assets of deposit money banks ratio,
- $Trad$: total value of stock transactions on domestic exchanges to private credit ratio.

Variables $C3$ and HHI are widely used to measure concentration in the banking sector. In addition, according to the traditional approach

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[1] The effects of concentration and competition in the banking sector are however generally ambiguous. According to some studies, concentration and competition could increase credit procyclicality. For example, Mandelman (2006) shows that markups are countercyclical and this monopolistic behavior increases the volatility of real variables.

[2] The PVAR model is performed on cyclical components since credit procyclicality refers to short-term fluctuations.

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[3] This sample of countries ensures data availability for the PVAR specification, and is also retained by Assenmacher-Wesche and Gerlach (2008, 2009) and Goodhart and Hofmann (2008).

[4] The seven variables do not play the same role in determining the composition of each cluster. Mean tests in Table 1 allow to assess this point (see Section 2.2). If mean tests show that a variable is not significant to characterize at least one cluster, removing this variable would have no consequences on clusters composition. For example, variable $Rest$ is only significant to characterize cluster 1, at the 10% level. If this variable is removed, modifications of cluster composition concern only Australia which moves from cluster 3 to cluster 1.