Banking and regional inequality in Brazil: an empirical note

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The paper investigates a neglected aspect of regional inequality in Brazil, namely regional inequalities related to financial flows. A synthetic regional financial inequality index is proposed and calculated in a semester basis over the 02-1994/02-2000 period. The inequality measure attempts to capture to what extent deposits in a given state translate into credit operations in that locality. Two main results emerge. First, non-negligible inequality patterns emerge when one considers the segment of private banks and those are consistent with an important proportion of states with a predominantly exporting pattern, for which deposits surpasses loans in that locality. Second, if one focus on the segment of public banks, an opposite pattern appears, that is consistent with decision patterns that might have, in part, a regional development motivation.

Keywords: banking; regional inequality.
JEL Classification: G21; O18.

INTRODUCTION

Traditional regional analyses focus on the dynamics of real variables. It should be emphasized, however, that financial and monetary variables are likely to exert important impacts in a more realistic context where money is non-neutral. In that sense, regional analysis of financial variables becomes relevant not only for the referred non-neutral impact of those but also for different local impacts given significant regional heterogeneities (see Chick and Dow, 1988, and Amado, 1997).

Regional heterogeneities are more important in large developing countries like Brazil (see e.g. Azzoni,1997; 2001). A hidden part of the regional inequalities might be associated with the pattern of financial flows across regions as the Brazilian banking system, unlike many other countries, is structured in terms of country-wide branching. In a heterogeneous setting, it is possible that deposits in a given state only partially imply credit operations in that state. If that kind of situation is pervasive, regional inequality would possess this financial flow component.

The regional dynamics of financial flows, however, has been scarcely investigated. In fact, the majority of earlier studies in Brazil focused on topics related to banking concentration see Resende, 1992a,b, and references therein) with the exception of works with a regional focus like Rodriguez (1982), Amado (1997), Barra and Crocco (2002) and Crocco et al. (2003).

The present paper considers a synthetic indicator for regional inequalities in terms of financial flows aspects that can be instrumental in analysing this other source of inequality. The paper is organized as follows. The second section presents conceptual aspects related to the summary measure adopted in the study. The third section discusses the data construction procedures and presents the empirical results. The fourth section brings some final comments.

MEASURING BANKING INEQUALITY ACROSS REGIONS

An appealing measure that is able to capture inequalities is provided by the index advanced by Theil (1967) upon concepts of Information Theory. That measure can be briefly described as follows:

Consider the prior probability for a given event A as given by x. If afterwards a message confirms the occurrence of such event, the emerging surprise degree will evolve in opposite direction of x. The informational content of a given message (henceforth h(x)) is inversely related with x. Among the possible decreasing functions, the author chose the logarithmic function as indicated next, due to the additivity property.

$$h(x) = \ln (1/x) \qquad (1)$$

One can generalize the previous reasoning to the case of several events A_1,..., A_n with prior probabilities x_1, ..., x_n. The probabilities of those events add to 1, since one of the events will occur. If the event A_1 occurs the informational content will be $h(x_1) = - \ln x_1$ as already explained. This argument can be generalized for n events and one can propose an expected information indicator as follows:

$$ET = \sum_{i=l}^{n} x_i h(x_i) = \sum_{i=l}^{n} x_i \ln(1/x_i) \quad (2)$$

It is possible to interpret ET as an inverse measure of concentration, whose range is situated between 0 e ln(n). A possible limitation of the previous measure of expected information is that it assigns posterior probabilities equal to 1, given

the certain occurrence of the events. A more general framework for approximating the informational content of a message should consider posterior probabilities that differ from 1. In the case of a single event, expression (1) readily generalizes to $\ln(y_i/x_i)$ where y_i denotes the posterior probability of an event after receiving a message. In the case of n events, Theil proposes an expected information measure that incorporate the posterior probabilities as weights:

$$I(y,x) = \sum_{i=l}^{n} y_i \ln(y_i / x_i) \quad (3)$$

It is important to emphasize that this measure generalizes the Entropy concentration index and the interpretation in terms of banking variables allows to investigate regional financial flows. This index, in fact, has not appeared in the literature before for analysing financial flows. In particular, in the case of a large heterogeneous country like Brazil it may be relevant to have a synthetic measure of the interrelationships between deposits and different forms of credit operations in a given region. More precisely, one wants to verify to which extent a given proportion of the former translates into a given proportion for the latter in different states. In this sense, expression (3) can readily be adapted for the present context, where x_i will denote a proportion in deposits and y_i refers to a proportion in credit operations. As we shall see, an intermediate step will be necessary to generate state aggregates upon bank-level data. Specifically, after generating deposit and loans market shares for each bank in a given state, one needs to generate a state aggregate across banks to be used in expression (3). For that purpose, we consider weighted averages of the aforementioned variables by using shares in total assets as weights.[1] The synthetic indicator just suggested can potentially uncover a different form of regional inequality in developing countries as resources generated in a given region may only partially translate into credit operations in that region.

In order to better interpret the previous measure, it is worthwhile to consider some important polar cases. First, the case of extreme equality, where the proportion of deposits is entirely translated in terms of a same proportion of credit operations in each state. In such circumstance, the index would collapse to zero (as $y_i = x_i \ \forall \ i$). A second case would be associated with a predominance of a large number of states with an important share in deposits relative to the share in credit operations. In this case, the index would have a negative value. Similarly, the opposite configuration would lead to a positive value for the index. In principle, one can expect that the second leading case would be more relevant for the Brazilian case. There is casual evidence indicating that, in relative terms, there is a significant (and dispersed) deposit pattern accruing from different poor states as compared with relatively concentrated credit operations at regional level. In fact, we will see in the next section that the Brazilian case conforms with that pattern.

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[1] In that case, information for Brazil as a whole was obtained from balance sheet data available from Banco Central do Brasil.

EMPIRICAL ANALYSIS

Data sources

This work relies on unpublished state-level data for each semester on main Brazilian banks for the 1994-2/2000-2 period. Special tabulations were provided by the Brazilian Central Bank for the largest commercial banks sorted by total assets (DEFIN-Banco Central do Brasil). The data was available for the largest ten banks in Brazil.[2] In order to make use of the synthetic measure proposed in (3) one needs to consider the proportion of deposits and credit operations at the state-level. Deposits comprised demand, time, saving and inter-financial deposits. Credit operations comprised the different modalities of loans. Since we start with bank-level data we conceived a weighted average of the ratio of proportions for each bank where the weights were given by the bank's share in total assets at national level. In fact, the criterion considered by Banco Central do Brasil to establish a ranking of banks is based on total assets. Once we have obtained state-level weighted averages of the bank-level data, the summary indicator given by expression (3) can be readily calculated.

Empirical results

The empirical literature on regional financial inequalities in Brazil is scarce with exceptions provided by Rodriguez (1982), Amado (1997), Barra and Crocco (2002) and Crocco et al. (2003). The first two works rely on more aggregate measures of inequality. The first investigated financial flows across states during the 1968-1980 period. The main result, obtained for private banks, indicated that there is a larger proportion of "exporting" states and that the pattern is stable over time. More specifically, for a exporting state deposits surpasses loans in that locality. For example, resources generated in the poor states of the northeast typically translate into credit operations in richer states of the southeast. Amado (1997), on the other hand, undertook a more aggregate perspective on regional flows. A central result refers to the temporal evolution of the loans/deposits ratio in the northeast region of Brazil that displayed a decreasing trend. This result motivates the relevance of a different form of regional inequality that refers to the low volume of loans relative to deposits in that particularly poor region.

Barra and Crocco (2002) and Crocco et al. (2003), on the other hand, undertake similar analyses in the context of micro-regions surrounding five state capitals (São Paulo, Rio de Janeiro, Belo Horizonte, Curitiba and Salvador). Under

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[2] We excluded the bank Nossa Caixa from the analysis due to its local presence in the state of São Paulo. We therefore considered the largest 9 banks that possess national coverage. The list of banks considered in this study are listed in the appendix.

this more disaggregated view, redeposit ratios as outlined before are considered. The papers also attempt to clarify the intuitive notion that higher redeposit ratios would be associated with the centrality and dynamism of the localities. For that purpose, the authors consider the multivariate statistical analysis technique of cluster analysis in the context of variables reflecting the prevalence of economic poles, subcontracting and the labor productivity.

The present paper takes those motivations further by considering disaggregated data and conceiving a synthetic inequality index. Initially, at a more descriptive level, we present in Tables 1, 2 and 3 the evolution of the state status in terms of "exporting" or "importing" characteristic for the whole sample and for the private and public banks in separate.

The inspection of Table 1 shows a large number of importing states especially in the North, Northeast and midwest regions. Among the exporting states, it is worth mentioning that some of those consistently displayed such pattern as was the case of Minas Gerais and Espírito Santo in the Southeast region, and Paraná, Santa Catarina and Rio Grande do Sul in the South region. Even though the aforementioned patterns apply in general there are some changes in the importing/exporting patterns over time. The inspection of Tables 2 and 3 shows that when one considers the segment of private banks those are consistent with an important proportion of states with a predominatly exporting pattern. If one focus on the segment of public banks, an opposite pattern emerges, that is consistent with decision patterns that might have, in part, a regional development motivation.

Next, we consider the evolution of the proposed regional financial inequality index (henceforth RFI index). The results are summarized in Table 4 and Figure 1.

Table 1: Importing and Exporting States (Whole Sample)

Region/State	94/2	95/1	95/2	96/1	96/2	97/1	97/2	98/1	98/2	99/1	99/2	00/1	00/2
North													
Acre	-	+	+	+	+	+	+	+	-	+	+	-	+
Amapá	-	-	-	+	+	+	+	+	-	+	+	-	-
Amazonas	+	-	-	+	+	-	+	+	-	+	+	-	-
Pará	-	+	-	+	+	+	+	+	-	+	+	-	-
Rondônia	-	-	+	+	+	+	+	+	-	+	+	-	-
Roraima	-	-	+	+	+	+	+	+	-	+	+	-	-
Tocantins	+	+	+	+	+	-	-	+	+	+	+	+	-
Northeast													
Alagoas	+	+	-	+	+	+	+	+	-	+	+	-	-
Bahia	-	-	+	+	-	+	+	-	-	-	+	-	-
Ceará	-	+	+	+	+	+	+	-	-	+	+	-	-
Maranhão	+	+	+	+	+	-	+	+	-	+	+	-	-
Paraíba	-	+	+	+	+	+	+	-	-	+	+	-	-
Pernambuco	+	+	+	+	-	+	+	+	-	+	+	+	-
Piauí	-	+	-	+	+	+	+	+	-	+	+	-	-
Rio Grande do Norte	+	+	-	+	-	+	+	-	-	+	+	-	-
Sergipe	-	+	+	+	+	+	+	+	-	+	+	-	-
Midwest													
Distrito Federal	-	+	+	-	+	-	-	-	-	+	+	-	-
Goiás	+	+	+	+	+	+	-	+	+	+	+	+	-
Mato Grosso do Sul	+	+	+	+	+	+	+	+	+	+	+	+	-
Mato Grosso	+	+	+	+	+	+	+	+	-	+	+	+	-
Southeast													
Espírito Santo	-	-	-	-	-	-	-	-	-	-	-	-	-
Minas Gerais	-	-	-	-	-	-	-	-	-	-	-	-	-
Rio de Janeiro	+	+	+	-	-	+	+	-	+	+	+	+	-
São Paulo	-	+	+	+	+	+	+	+	+	+	+	+	-
South													
Paraná	+	+	-	-	-	-	-	-	+	-	-	-	-
Rio Grande do Sul	-	+	-	-	-	-	-	-	+	-	+	-	-
Santa Catarina	-	-	-	+	-	-	-	-	+	-	+	-	-

+ Importing   - Exporting

Table 2: Importing and Exporting States (Private Banks)

Region/State	94/2	95/1	95/2	96/1	96/2	97/1	97/2	98/1	98/2	99/1	99/2	00/1	00/2
North													
Acre	-	+	-	-	+	+	+	+	+	-	-	-	-
Amapá	-	-	-	-	-	-	+	-	-	-	-	-	-
Amazonas	-	-	-	-	-	+	-	-	-	-	-	-	-
Pará	-	-	-	-	-	-	-	-	-	-	-	-	-
Rondônia	-	+	+	+	-	+	+	-	-	-	-	-	-
Roraima	-	-	-	-	-	-	-	-	-	-	-	-	-
Tocantins	+	+	+	-	-	+	+	+	+	-	-	-	-
Northeast													
Alagoas	+	-	-	-	-	-	-	-	-	-	-	-	-
Bahia	-	-	+	-	-	-	-	-	+	-	-	-	-
Ceará	-	+	+	-	-	-	-	-	-	+	-	-	-
Maranhão	-	-	-	-	-	-	-	-	-	-	-	-	-
Paraíba	+	-	-	-	-	-	-	-	-	-	-	-	-
Pernambuco	-	-	-	-	-	-	-	-	-	+	-	-	-
Piauí	-	-	+	-	-	+	-	-	-	-	-	-	-
Rio Grande do Norte	-	-	-	-	-	-	+	-	-	-	-	-	-
Sergipe	-	+	-	-	-	-	-	-	-	-	-	-	-
Midwest													
Distrito Federal	+	-	-	-	-	-	-	-	-	-	-	-	-
Goiás	+	-	-	-	-	-	-	-	-	-	-	-	-
Mato Grosso do Sul	-	+	+	-	-	-	-	-	-	-	-	-	-
Mato Grosso	-	+	+	-	+	+	+	+	+	-	-	-	-
Southeast													
Espírito Santo	-	+	+	+	+	+	+	+	+	+	-	-	+
Minas Gerais	+	-	-	-	-	-	-	-	+	-	-	-	-
Rio de Janeiro	+	+	+	+	+	-	-	-	-	-	-	-	-
São Paulo	-	+	-	-	+	+	-	-	+	-	+	+	+
South													
Paraná	-	-	-	-	-	-	-	-	+	+	-	-	-
Rio Grande do Sul	+	+	+	-	-	-	-	+	+	-	-	-	-
Santa Catarina	-	-	+	-	-	-	-	-	+	-	-	-	-

+ Importing   - Exporting

Table 3: Importing and Exporting States (Public Banks)

Region/State	94/2	95/1	95/2	96/1	96/2	97/1	97/2	98/1	98/2	99/1	99/2	00/1	00/2
North													
Acre	-	+	-	+	-	+	+	-	-	-	+	-	-
Amapá	-	-	+	+	+	+	+	-	-	-	+	-	-
Amazonas	-	+	-	+	+	+	+	-	-	+	+	-	-
Pará	-	+	-	+	+	+	+	-	-	-	+	-	-
Rondônia	-	+	-	+	+	+	+	-	-	-	+	-	-
Roraima	-	+	+	+	+	+	+	-	-	-	+	-	-
Tocantins	-	+	-	+	-	-	-	+	+	+	-	+	-
Northeast													
Alagoas	-	+	-	+	+	+	+	-	-	+	+	-	-
Bahia	-	-	+	+	-	+	+	-	-	-	+	-	-
Ceará	-	-	+	+	+	+	+	-	-	+	+	-	-
Maranhão	-	+	-	+	+	-	+	-	-	-	+	-	-
Paraíba	-	+	+	+	-	+	+	-	-	+	+	-	-
Pernambuco	-	-	+	+	-	+	+	-	-	-	+	+	-
Piauí	-	+	-	+	+	+	+	+	+	+	+	+	+
Rio Grande do Norte	-	+	-	+	-	+	+	-	+	+	+	-	-
Sergipe	-	+	-	+	+	+	+	-	-	-	+	-	-
Midwest													
Distrito Federal	-	+	+	-	+	-	-	-	-	-	+	-	-
Goiás	-	+	+	-	+	-	-	+	-	-	-	+	+
Mato Grosso do Sul	-	+	-	-	-	-	+	+	+	+	-	+	+
Mato Grosso	-	+	-	-	-	-	+	+	-	+	-	+	+
Southeast													
Espírito Santo	-	+	-	+	-	-	-	-	-	-	-	-	-
Minas Gerais	-	-	-	+	-	-	+	+	-	-	-	-	-
Rio de Janeiro	-	-	+	-	-	+	+	+	+	+	+	+	+
São Paulo	-	+	+	+	+	+	+	+	+	+	+	+	+
South													
Paraná	-	+	-	-	-	-	-	+	+	+	-	+	+
Rio Grande do Sul	-	+	-	-	-	-	-	-	-	-	+	-	+
Santa Catarina	-	+	-	+	-	-	-	-	-	-	-	-	-

+ Importing   - Exporting

Table 4: Theil's expected information index

	Whole Sample	Private Banks	Public Banks
12/94	-0,0211	-0,2782	-2,9977
06/95	0,0727	-0,2082	0,3171
12/95	0,0019	-0,1862	-0,0421
06/96	0,4473	-0,5789	0,4766
12/96	0,2535	-0,3829	0,1506
06/97	0,2558	-0,3188	0,1652
12/97	0,2876	-0,3048	0,3239
06/98	0,0417	-0,3136	-0,0137
12/98	-0,0948	-0,2493	0,0226
06/99	0,1027	-0,4758	0,0421
12/99	0,4864	-1,2070	0,1796
06/00	-0,2118	-1,3206	-0,0973
12/00	0,2408	-0,8337	-0,0343

Figure 1:
Evolution of the regional financial Index-RFI in different segments of Brazilian banks

RFI

····· Whole Sample   ——— Private Banks   – ■ – Public Banks
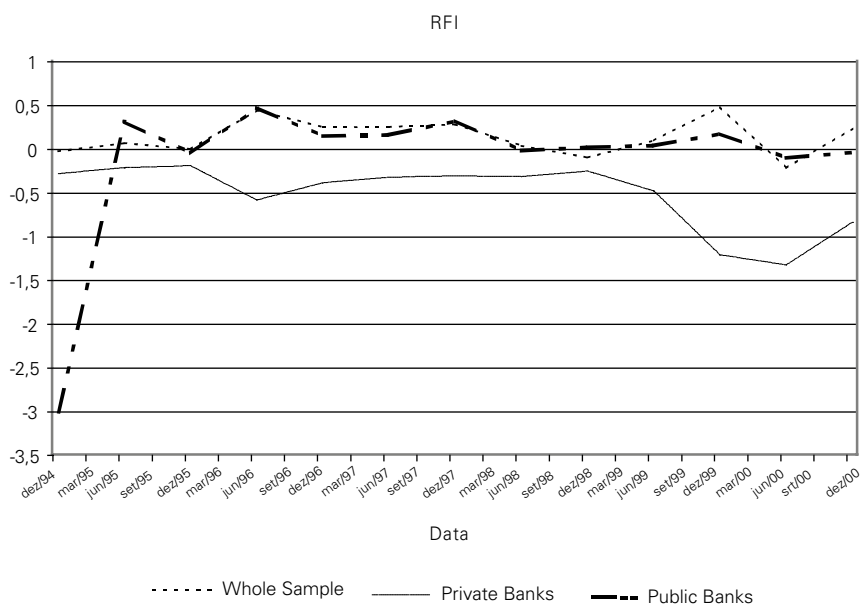
As mentioned before, an important benchmark for equality would refer to values close to unity. The analysis was carried out in two steps. First, we focus the analysis in the whole sample that comprises both public and private banks. In that case, one can detect an erratic pattern with both positive and negative values and yet nearly zero magnitude. In that sense, situations with small to moderate inequal-

ity appear for that broader group of banks. It is important to stress, however, that the decision processes of public banks are likely to be partially distinct from the private segment.[3] In fact, it is common to observe the presence of branches of the largest public bank in Brazil (Banco do Brasil) even in remote localities with low economic potential. Moreover, the important role of that bank in subsidizing agricultural funding is noteworthy.[4] This pro-active economic promotion aspect appears, in part, in terms of the evolution of the RFI index in the previous table. The referred measure displays a large proportion of positive and moderate values.

After we exclude the public banks from the analysis, it is possible to observe a consistent behavior of the index in terms of negative values that are predominantly moderate but that approach a higher inequality towards the end of the sample period. The observed path of the RFI index for the private segment is consistent with an important inequality where there is large proportion of predominantly "exporting" states.

The analysis indicated that when one focuses on the segment of private banks, the inequality index is relatively stable in the intermediate periods but shows less negligible discrepancy with respect to the an equality benchmark by the end of the period. The evidence indicates that the referred inequality might be a relevant phenomenon though the changes over time not always are expressive.

FINAL COMMENTS

The paper investigated regional heterogeneities in financial flows in Brazil. For that purpose, we considered a synthetic regional financial inequality index-RFI, that allowed to pinpoint the extent to which deposits in a given locality translates into credit operations in that locality. The RFI index summarized that relationship in terms of a single indicator that captured the situation in the different states. The main result that emerged was a non negligible inequality when one focus in the segment of the private banks. Such pattern is consistent with an important proportion of "exporting" states and may motivate another kind of regional inequality that might be relevant in a country characterized by strong regional constrasts. If one considers the segment of public banks, a very distinct pattern emerges that can be related in part to the existence of a social component in their decision processes. In either case, it is important to stress that no drastic changes of the RFI index occur over time, but the time frame for which data was available was short in this study.

Having advanced the possibility of a financial inequality component in re-

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[3] The importance of separating the public and private bank segments in Brazil had been previously recognized by Resende (1992b) in the context of banking concentration.

[4] Other social motivations are important in the operation of other public bank like Caixa Econômica Federal that has an important role in funding real state acquisition for lower income classes consumers.

gional inequalities in Brazil, it would be important to further pursue this kind of analysis by exploring the determinants of regional financial inequality by means of econometric analysis. This line of research is restricted in the present by the non availability of the necessary data for a large number of periods. In fact, different variables that are associated with the perceived potential of a given state that relate to local business cycle and yet complex tax competition at the state and the municipality may be important explanatory factors, among others, for the observed inequality as captured by the RFI index. Those research avenues are relevant for future investigations.

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APPENDIX

List of banks

Public banks
  • Banco do Brasil S.A.
  • Banco do Estado de São Paulo S.A. (Banespa)
  • Caixa Econômica Federal

Private banks
  • Banco Real S.A.
  • Banco Bradesco S.A.
  • Banco Itaú S.A.
  • União dos Bancos Brasileiros S.A. (Unibanco)
  • Banco Safra S.A.
  • Banco Santander do Brasil S.A.