

■ Research Article

The Financial Crisis of Banks (Before, During and After): An Intellectual Capital Perspective

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The purpose of this paper is to evaluate the link between intellectual capital components and financial performance across three temporal periods on either side of a financial crisis.

The study offers a longitudinal approach, combining two data collecting methods. A survey on intellectual capital components was administered during the initial period followed by objective performance ratios in subsequent time periods (covering pre, during and post-financial crisis analysis). Regarding the three periods in the study, evidence seems to support the argument that intellectual capital scores are good predictors of future banking performance. One bank in particular that was ranked very low in 2005 intellectual capital scores eventually failed to survive autonomously. By 2012, it was forced to be rescued by governmental aid using public funds. Generally speaking, we can argue that intellectual capital average scores are good predictors of future banking performance.

The study's generalizability is limited to the Portuguese banking industry. This is the first academic research study to evaluate the link between intellectual capital and the financial performance of banks across three temporal periods: 2005–2006 (pre-crisis), 2007–2008 (during crisis), and 2009–10 (post-crisis). Copyright © 2014 John Wiley & Sons, Ltd.

The global financial crisis in 2007–2008 is considered to be one of the worst since the great depression of the 1930s (Reinhart and Rogoff, 2013). The economic fallout was significant as national governments were tasked with bailing out banks and other sectors (e.g. auto manufacturing). Generally speaking, the crisis also led to prolonged unemployment, housing foreclosures and a significant decline in business investment and consumer spending (Reinhart and Rogoff, 2009). However, the banking sector was the most affected when the crisis erupted (Cecchetti, 2009).

The origins of the banking industry's problems go back to deregulation of the financial markets (Helleiner, 2011). Relaxing governmental and regulatory controls, while simultaneously increasing stimulus for global trade, created the scenario for a perfect storm. To respond to the increasing need of funds, banks started to raise money from markets

all across the globe. This liberalization of credit created an expansion of debt. According to Bordo (2008), the inevitable consequence was a state of overindebtedness. Another event that enhanced the explosive effect of the crisis was the boost in oil prices that started to rise sharply in 2007 (Taylor, 2009). The confidence in worldwide markets was shaken, and a global slowdown of the economy resulted. Inevitably, there was a sharp rise in defaults. Banks played a double role in the crisis. On the one hand, they helped finance the boom in credit. On the other hand, they were victims of their own largesse (Roubini and Mihm, 2010). This crisis in confidence was conducive to major liquidity problems. Given the confounding economic factors that led to this crisis, could the financial meltdown have been avoided? Moreover, are there other potential signals that are independent of financial results that could have provided a warning?

In this paper, we address the link between intellectual capital and the performance of banks across three temporal periods: 2005–2006 (pre-crisis), 2007–2008 (during crisis), and 2009–2010 (post-crisis).

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LITERATURE REVIEW

Intellectual capital represents an intangible resource that has no physical existence yet is still used in the development of products and services (Reinhardt *et al.*, 2003). As such, it may include both human (e.g. expertise) and non-human (e.g. documents) factors. For several decades, the strategic management literature has associated these intangible factors with performance heterogeneity (Rouse and Daellenbach, 2002). The academic field of intellectual capital has grown significantly in recent years (Bontis and Serenko, 2009).

The intellectual capital concept emerged from the difference between the market and book value of a firm as originally conceptualised by Leif Edvinsson while he was Chief Knowledge Officer at Skandia in the 1990s (Bontis, 1996; 1999). The concept has since been used to represent a firm's wealth of ideas and ability to innovate (Edvinsson, 1999). Correspondingly, we can suggest that intellectual capital represents the 'stock' of knowledge that exists in an organization (Bontis *et al.*, 2002). As such, intellectual capital is considered to be a powerful resource (Grant, 1991) that is often recognised as the most valuable one (Stewart, 1997). As an intangible asset (Sveiby, 1997), intellectual capital is often considered at the root of competitive advantage (Birchall and Tovstiga, 1999; Davenport and Prusak, 2000), thereby driving organizational performance and creating value (Cabrita and Landeiro De Vaz, 2005).

Conceptually speaking, there is wide agreement in the literature that intellectual capital consists of three subdomains: human, structural and relational capital (Edvinsson, 2013). The field has evolved as different dimensions, or stocks, of intellectual capital have been linked to each other and various endogenous constructs (e.g. financial performance). The specific components considered in this particular study are human capital and structural capital. Human capital represents, in a simplified way, the knowledge (generally in its tacit form) that is embedded in the minds of employees in the form of experiences and expertise (Sánchez *et al.*, 2000). Human capital presents a certain degree of mobility, but the capabilities employees possess are typically valuable to only one firm at a time (Hatch and Dyer, 2004; Curado and Bontis, 2006). Structural capital consists of the stock of knowledge embedded in explicit documents, routines and organizational artefacts (Sánchez *et al.*, 2000; Appuhami, 2007). We find these two intellectual capital components highlighted in previous work by Crossan and Hulland (2002) and Martinez-Torres (2006).

THEORETICAL FRAMEWORK

Managing intellectual capital within the service sector is of particular importance (Bowen and Ford,

2002). In these firms, knowledge is the key element of competitive differentiation (Gratton and Ghoshal, 2003). The service sector is particularly suitable as an intellectual capital research setting because of the relevancy and significance that intangible resources play (Starbuck, 2002). It is generally recognised that firms with higher levels of intangible assets perform better than those with lower levels. Generally speaking, both human capital and structural capital are associated positively with organizational performance (Hitt *et al.*, 2001; Sharma, 2012). In fact, researchers have determined that high level firms have significantly better returns (Chen *et al.*, 2005), less variability in stock price (Bramhandkar *et al.*, 2007), and higher levels of productivity (Banimahd *et al.*, 2012).

The generalizability of such findings is also widely considered across various sectors such as design firms (Shih *et al.*, 2010), pharmaceuticals (Kamath, 2008; Sharabati *et al.*, 2010), hospitals (Rafiei *et al.*, 2012), software companies (Venugopal and Subah, 2012), and multinationals (Riahi-Belkaoui, 2003). When it comes to managing intellectual capital in banks, the finance function has a key role to play in appreciating the source of a firm's value (Irene and Hooi, 2009). Within the banking sector, several research studies have shown a significant positive link between intellectual capital and financial performance (Pulic, 1997; Bontis and Fitz-enz, 2002; Bontis *et al.*, 2002; Crossan and Hulland, 2002; Stovel and Bontis, 2002; Mavridis, 2004; Goh, 2005; Cabrita *et al.*, 2007; Kamath, 2007; Cabrita and Bontis, 2008; El-Bannany, 2008; Liu, 2009; Bharathi, 2010; Murale *et al.*, 2010) and consequently on competitive advantage (Ranjith, 2007; Curado, 2008; Bataineh and Al-Zoabi, 2011).

Evaluating the contribution of intellectual capital components to organizational performance is a challenging task that needs to be addressed. Although the majority of extant studies have shown a positive relationship between intellectual capital and financial performance in a variety of sectors and geographical contexts, there have been some alternative results. For example, the work by Rehman *et al.* (2011, 2012) shows that there is no significant link between human capital and structural capital on the performance of banks in Pakistan. Conversely, Zou and Huan (2011) show a significant relationship does exist in China. Latif *et al.* (2012) try to explain this inconsistency by distinguishing between Islamic and conventional banks, while Puntillo (2009) argues that the relationship in Italian banks is limited at best. Clearly, there is no confidence in the universality that intellectual capital has a positive influence on banking performance in all contexts. Indeed, there may be specific instances (e.g. certain countries and certain banking styles) where this is not the case. However, there is one more context that may give rise to an alternative view.

What if general economic conditions also play a role in the evaluation of the linkage between intellectual capital and performance? Perhaps, the often-assumed positivistic perspective is only evident when the markets are growing naturally. What if the markets are poor? Indeed, what if there is a financial crisis? The main objective of this study is to examine the relationship between intellectual capital and performance within the banking sectors at three temporal periods: pre-financial, during and post-financial crisis.

METHODOLOGY AND MEASURES

According to Barney (1991), the resource-based-view perspective should adopt the organization as its unit of analysis. Most researchers that work within the knowledge-based domain are slowly moving away from individual analysis to focus on the organizational level (Seshadri and Shapira, 2003). Organizational level analysis is capable of identifying the importance of non-human elements (Crossan and Berdrow, 2003), within single industries (Hitt *et al.*, 2001; Rouse and Daellenbach, 2002). This approach has been adopted by a variety of researchers (Bontis, 1998; Hitt *et al.*, 2001; O'Regan *et al.*, 2001; O'Donnell *et al.*, 2006). We used a longitudinal approach for our study by triangulating two different data collection methods at two different times. First, we conducted a survey that measured perceptions of intellectual capital components, and then, we compared those results to performance ratios in subsequent time periods using a financial database.

A popular methodological approach to address the intellectual capital phenomenon has been the utilization of Pulic's value added intellectual coefficient method (Pulic, 1997, 1998, 2000, 2002, 2004). This method measures the efficiency of different firms' inputs: physical, financial, human, and structural capital. While it is a common approach (Murale *et al.*, 2010; Banimahd *et al.*, 2012; Rahman, 2012) especially in the banking industry (El-Bannany, 2008; Zou and Huan, 2011; Latif *et al.*, 2012), it does not offer conclusive evidence on the nature of the relationship (Firer and Williams, 2003; Puntillo, 2009, and Venugopal and Subah, 2012).

We took a different methodological approach by focusing on the measurement items embedded within two intellectual capital constructs: human and structural capital as espoused by Bataineh and Al-Zoabi (2011) and Cater and Cater (2009). For performance measures, we chose three different ratio categories: capital adequacy, profitability and liquidity ratios. This approach followed previous studies on banks' intellectual capital impact over performance as supported by Zou and Huan (2011) and Banimahd *et al.* (2012). Our unique

methodology also considers a longitudinal perspective that spans the pre-2008, during, and post-2008 periods of the financial crisis spanning 6 years. Such long-term studies in the field of intellectual capital are generally rare.

Capital adequacy is used to determine the capacity of banks to meet their obligations subject to risks that have been incurred. The following measures were used as proxies for capital adequacy: Tier 1, equity capital (EQTY), capital structure (KSTRCT), equity to loans (EQLOAN) and impaired loans to equity (Imp LOANEQTY).

- Tier 1 consists of common equity and reserves and indicates the bank's financial strength and compliance with regulations. Under the BASEL III regulatory framework, this ratio is set to a minimum of 6%. Related to this ratio, we can find Tier 2 (known as supplementary capital, which includes undisclosed reserves, revaluation reserves, general loan-loss reserves and hybrid capital instruments) and Total Tier regulatory (calculated as the sum of Tier 1 and Tier 2). For the purposes of this study, we only used Tier 1 as supported by Osborne *et al.* (2012).
- EQTY is defined as the ratio of total equity to total assets. This measure judges the capital strength of a bank and is a proxy for the bank's ability to absorb losses (Berger, 1995; Thakor, 1996).
- KSTRCT is the ratio of equity to liabilities and measures the capacity of using capital to cover debts (Hassan and Bashir, 2003)
- EQLOAN represents the ratio of equity to loans and shows the degree of coverage—also known as the cushion that a bank has to absorb losses (Hassan and Bashir, 2003).
- Imp LOANEQTY represents the ratio of impaired loans to equity and indicates the problematic loans as a percentage of the banks' equity (Sailesh *et al.*, 2005).

Profitability ratios indicate the rate of return on invested capital and assets. The metrics in this category include net interest margin (NIM), return of average assets (ROAA), return of average equity (ROAE), efficiency (EFCY) and non-interest expense to average assets (NIEXA).

- NIM is calculated as the ratio of net interest income to total average assets and represents the profitability of the lending business (Demirgüç and Huizinga, 1999)
- ROAA is the ratio of net operating income to total average assets and shows the profitability of the investments of the bank. It is an indicator of efficiency and operational performance (Pasiouras and Kosmidou, 2007; Dietrich and Wanzenried, 2011)
- ROAE is expressed as the net operating income to total average equity and represents the

profitability of the bank's capital (Goddard *et al.*, 2004, 2007)

- EFCY results from the expression of non-interest expense to gross revenues and shows the extent to which operating expenses absorb operating revenues, giving the picture of the cost side of the banks' performance with respect to revenue (Pasiouras and Kosmidou, 2007; Dietrich and Wanzenried, 2011)
- NIXA is calculated as NIXA and is derived from fee-based services such as charges on deposits and consulting fees. It is a proxy for the income share of non-banking activities (Carbo Valverde and Rodriguez Fernandez, 2007)

Liquidity ratios indicate the bank's ability to meet debt obligations. These measures include: ratio of cover of loans to deposits (LOANDEP), net loans to assets (NETLOANASST), assets to funding (ASSTFUND), customer deposits to total funding (DEPFUND) and the interbank ratio.

- LOANDEP is the ratio of cover loans to customer deposits, shows the percentage of the bank's loans funded by deposits. It assesses bank liquidity, and it illustrates if the bank is vulnerable to sudden adverse changes in deposits or if it has unproductive capital that is not earning as it should be (Hassan and Bashir, 2003).
- NETLOANASST is expressed as the ratio of NETLOANASST and indicates the percentage of loans covered by assets (Carbo Valverde and Rodriguez Fernandez, 2007).
- ASSTFUND is the ratio of net ASSTFUND, shows the percentage of fund that could be met if customers withdraw funds suddenly (Bunda and Desquilbet, 2003).
- DEPFUND is the ratio of total DEPFUND of the bank, evaluates the percentage of funds that comes from deposits, as deposits are the main source of funding of the bank (Hassan and Bashir, 2003).
- INTERBANK is the ratio is the funds lent to other banks, divided by the funds borrowed from other banks (Hassan and Bashir, 2003).

DATA COLLECTION

In this paper, we address the performance of banks across three temporal periods: 2005–2006 (pre-crisis), 2007–2008 (during crisis), and 2009–2010 (post-crisis). These temporal periods are commonly adopted in the research literature (Chari *et al.*, 2008; Reinhart and Rogoff, 2009; Helleiner, 2011). Firstly, we collected primary data by using a survey to gather initial information in 2005 from 9 out of the 11 banking groups operating in Portugal at the time. Previously, we had run a pre-test and a pilot test on a convenient sample to identify possible errors or problems related

to items and constructs as recommended by Bontis *et al.* (2002). We chose large banking groups in order to address institutions that have a national dimension, taking into account the country's size, economic context and the national banking industry structure. We delivered the questionnaires directly to the banks and asked the banks to distribute them on our behalf according to our individual sampling criteria (i.e. banks' employees in top hierarchical levels—level 12 or higher—out of 18 levels in the banking industry in Portugal, randomly stratified across all functional and geographical groups). Senior employees were targeted for sampling because they would be more knowledgeable about the research topic and had a more strategic orientation (Malhotra and Grover, 1998).

We collected 1231 complete questionnaires out of the 2000 delivered (62% response rate; Table 1). Of the total returned surveys, 1069 were ultimately valid and used. The survey items for the intellectual capital components came from previously validated research reported in the literature (Bontis, 1998; Bontis *et al.*, 2000, 2002; Bataineh and Al-Zoabi, 2011) with survey items using a seven point Likert-type scale.

Secondly, in order to assess the financial performance of the banks, we collected data from Bankscope (2005–2010) and selected several ratios divided into three categories: capital adequacy, profitability, and liquidity ratios as previously described. Table 2 presents the ratios used in the study.

Each ratio was calculated for each year and then averaged for each of the three temporal periods. The banks were then ranked in descending order according to the values of each particular ratio. We repeated the same procedure for each of the 15 ratios.

We then collapsed each of the 15 ratios into the corresponding three categories and ranked all the banks across each of the categories. Finally, we summed up the three category rankings and ranked the banks in descending order according to overall financial performance. In all rankings (Tables 4–6), 'Number 1' refers to the bank that performed the best.

DATA ANALYSIS AND RESULTS

We validated the reliability and internal consistency of the survey items by using Cronbach's alpha (Table 3). Both values were above the minimum 0.7 threshold, which was consistent with previous studies.

We also calculated the average mean scores for each of the intellectual capital components across all of the banks in the study (Table 4). This table illustrates the calculation for only 1 year (2005), but the same process was used for all corresponding years across all three temporal periods.

Table 1 Survey sampling

Bank	Number of branches	Number of employees	Sent questionnaires	Received questionnaires
A	85	835	50	50
B	496	6104	175	116
C	421	4286	175	92
D	469	4009	200	101
E	113	822	100	73
F	994	9037	500	320
G	782	10 428	500	318
H	149	1469	150	85
I	296	2890	150	76
Total	3805	39 880	2000	1231

Table 2 Banking financial performance ratios

Category	Ratio	Designation and description
Capital adequacy	Tier 1	Capital regulatory ratio
	EQTY	Equity capital (equity/total assets)
	KSTRCT	Capital structure (equity/liabilities)
	EQLOAN	Equity/loans
Profitability	LOANEQTY imp	Impaired loans/equity
	NIM	Net interest margin (net interest income/average assets)
	ROAA	ROAA (net operating income/total average assets)
	ROAE	ROAE (net operating income/total average equity)
	EFCY	Efficiency (non-interest expense/gross revenues)
	NIEXA	Non-interest expense/average assets
Liquidity	LOANDEP	Cover loan deposits (loans/customer deposits)
	NETLOANASST	Net loans to assets
	ASSTFUND	Net assets to funding
	DEPFUND	Customer deposits/total funding
	INTERBANK	Funds lent to other banks/funds borrowed from other banks

We also calculated the rankings for the financial ratios using data from Bankscope across the whole period (Table 5).

This same financial performance calculation was performed for each of the three temporal periods as well (Table 6).

Figure 1 illustrates the relative rankings of the banks comparing the initial IC (intellectual capital) assessment in 2005, with the three temporal periods.

DISCUSSION

The purpose of this paper was to evaluate the link between intellectual capital components and financial performance across three temporal periods on either side of a financial crisis. Banks C, D, F and G represent the top intellectual capital scores in 2005. By occupying these positions, it was reasonable to expect superior future performance for

Table 3 Cronbach's alpha

Intellectual capital components	Number of items in the scale	Cronbach's alpha
Human capital	24	0.874
Structural capital	21	0.926

those banks (Riahi-Belkaoui, 2003). The empirical evidence in this study seems to support the argument that intellectual capital scores are strong predictors of future banking financial performance. Most of the banks in the top half ranking places for intellectual capital scores in 2005 subsequently ranked in the top half for financial scores in the post-crisis period.

The only organization in our sample that fell out of its predicted half was bank F. It was ranked first in intellectual capital scores in 2005, but its post-crisis financial situation ranked it in the middle of the pack. Further analysis on this bank's particular situation is warranted; however, secondary information in the press describes a very difficult transition during the financial crisis and an extremely deep restructuring that took place.

On the other hand, banks A, E, H and I represented the lowest intellectual capital scores in 2005. By occupying such positions, it was reasonable to anticipate relatively poor financial performance for those banks post-crisis. This anticipated result was generally realised.

The only unexpected performance with this lower intellectual capital group was with bank H. As the crisis continued, its financial performance continued to rise across the three temporal periods considered in the study (rank: 7, 5 and 3). After examining this bank in further detail, it was discovered that it failed to survive autonomously and in 2012 was rescued by governmental aid using public funds. It seems that in this particular case, financial indicators were not insightful and reliable. They were in fact fallible. Based on the financial ranking positions for the

Table 5 Financial data rankings for whole period (2005–2010)

Bank	Capital adequacy	Profitability	Liquidity	Ranking
A	5	8	4	7
B	7	3	3	5
C	2	1	6	2
D	1	2	2	1
E	9	9	7	9
F	3	6	5	4
G	6	6	1	3
H	3	5	8	6
I	8	4	9	8

Table 6 Financial data rankings for each temporal period

Bank	2005-2006 pre-financial crisis	2007-2008 during	2009-2010 post-financial crisis	Ranking
A	6	7	7	7
B	5	4	5	5
C	2	2	2	2
D	1	1	1	1
E	9	9	9	9
F	3	6	5	4
G	3	3	4	3
H	7	5	3	6
I	8	8	8	8

three periods, bank H appeared to be robust enough to survive long term. Ultimately, bank H was ranked relatively low in 2005 on intellectual capital scores. This diagnostic was perhaps underestimated, and it failed to alert bank managers and financial markets as to pending financial results.

Overall analysis of initial intellectual capital scores in 2005 and financial performance assessed at pre-financial, during and post-financial crisis periods reflected on Figure 1 seem to show that

Table 4 Average scores and corresponding ranks

Bank	Average human capital (AHC; 2005)	Average structural capital (ASC; 2005)	Average AHC + ASC (2005)	IC rank (2005)
A	5.37	4.26	4.81	9
B	5.49	5.21	5.35	5
C	5.54	5.26	5.40	2
D	5.57	5.24	5.40	2
E	5.44	5.14	5.29	6
F	5.63	5.85	5.74	1
G	5.57	5.21	5.39	4
H	5.16	4.48	4.82	8
I	5.47	4.76	5.12	7

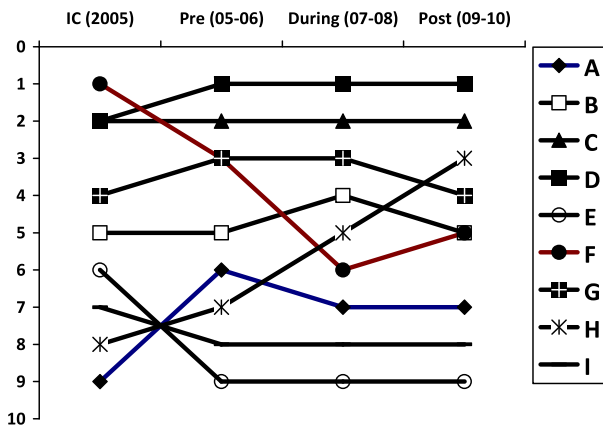


Figure 1 Ranking results of banks over time

intellectual capital metrics are generally strong predictors of financial performance.

CONCLUSIONS

From the results of this study, we can ascertain that intellectual capital scores are good predictors of future banking performance. When addressing successful banks, early top ranking positions in intellectual capital scores were matched by subsequent top ranking positions in financial performance. Financial performance ranking positions in pre-financial, during and post-financial crisis were stable at top levels for such banks. Overall financial performance ranking positions for the entire period covered in the study (2005–2010) were also equally good for those banks. Furthermore, a bank holding a poor early ranking position in intellectual capital scores failed to survive autonomously.

This study is among the first to use intellectual capital scores to predict future financial results across various temporal periods during a financial crisis. As such, it makes an important contribution to the theoretical justification for the predictive power of intellectual capital scores. However, this paper also suffers from a number of limitations that serve as opportunities for future work.

Although this study calculated data from 9 out of the 11 nationwide banking groups in Portugal in 2005, it can be argued that the study may not be generalised outside the Portuguese banking industry. Different bank sizes in the sample may have also influenced results because the size effect was not accounted for. This study can be refined and further extended by administering a post-period survey administration to collect data and update the intellectual capital assessment. This would allow researchers the opportunity to provide more evidence and undertake a more comprehensive data analysis. Considering the data set and metrics used, this study could be replicated in the future across a larger sample of banks in various countries and

regions. It is hypothesised that national differences will matter given different regulatory frameworks across nations. The study does not account for bank size effects, and given the data used, generalization is not possible outside the Portuguese banking industry. Opportunities for future research also emerge from the possibility of running this study in other industries in search for different intellectual capital prediction characteristics over time.

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