

# **Risk Culture in Banks: Just Words?**

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*(Preliminarily draft, do not quote without the authors' permission)*

## **Abstract**

In the aftermath of the 2008 financial crisis, regulators and industry identified weak risk governance and culture as a shortcoming of the financial system. Based on the indicator proposed by the Financial Stability Board's framework and using quantitative text analysis, we develop a new measure of bank sound risk culture and apply it for the largest European banks during the 2004 - 2014 period. Results show that this measure is associated to greater bank stability and a higher loan portfolio quality.

**Keywords:** risk culture, bank performance, bank stability, text analysis

**JEL classification:** G2, M14

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## **Introduction**

In the aftermath of the 2008 financial crisis, regulators and industry identified weak risk governance and culture as a shortcoming of the financial system (Parliamentary Commission on Banking Standards, 2013; House of Commons Treasury Committee, 2009; Institute of International Finance, 2009).

Literature suggests that different corporate governance aspects could affect a bank's stability: incentives (Lehman & Hofmann, 2010), internal communication and compensation practices (Senior Supervisors Group, 2009), risk management (Bonaccorsi Di Patti & Kashyap, 2014; Aebi, et al., 2012), board's values (Davidson et al., 2015). However these evidences do not fully explain banks' persistent negative outcomes (Fahlanbrach et al., 2012; Ellul & Yerramilli, 2013).

Choices related to risk are the result of a complex combination of beliefs, knowledge and attitudes (Financial Stability Board, 2014). Since banks face choices that cannot be properly regulated *ex ante*, risk culture may have an important role in explaining their behaviour. According to Timothy Geithner's memoir of the financial crisis of 2007-2008, "firms with cultures that valued risk management and risk managers tended to be stronger and more conservatively financed".

Better risk understanding and the ability to have effective supervisory conversations around a bank's risk culture are powerful preventive tools. As a consequence, regulators are pushing financial institutions to improve their own risk culture but, given the absence of a formal and shared definition, measurement of the quality of risk culture seems to be difficult.

To this aim, Financial Stability Board, 2014 identified some common foundational elements that support a sound risk culture within the institution. This framework defines a basis for supervisors and banks to promote and develop a shared understanding of the risk culture focusing on four main areas: i) tone from the top, ii) accountability, iii) effective communication and challenge, and iv) incentives.

Surprisingly, to our best knowledge, there are no authors analyzing to what extent a risk culture influences the behaviour of financial institutions. Our paper aims at measuring the risk cultures of banks and assessing their relationship with performance and stability. In detail, we apply the FSB framework to understand if the costs imposed to banks in developing a sound risk culture (SRC) are justified, providing an answer to the following questions: Is SRC associated

with a higher banks' stability? Does SRC influence banks' performance? Which components of the SRC's Framework are more relevant for banks' stability? How does it impact loan portfolio management?

To this aim, we develop a *Sound Risk Culture Indicator (SRCI)*, applying quantitative text analysis to annual, corporate governance and Pillar 3 reports of a sample of 147 European commercial banks during the 2004 - 2014 period.

We obtain two main results. First, an higher sound risk culture is associated with higher banks returns. Second, a higher sound risk culture is also correlated with a higher bank's ability to manage its loan portfolio, with a significant negative impact on loan loss provision on gross loans.

This paper has important implications. First, we measure objectively banks' risk culture through text data processing of their official documents, assuming that words and expressions used by each bank reveal information on its values. Second, we provide evidence of how cultural traits are likely to affect financial institutions performance and risk taking. This result may help supervisors in better identifying/explaining the drivers of banks behaviour and moral hazard.

The rest of the paper is structured as follows. Section 2 presents risk culture's definitions and role for banks; section 3 illustrates the sample and the methodology applied to compute SRCI; the results of fixed effect regression models are in Section 4, while Section 5 contains the final conclusions.

## **2. Risk culture: definition and role for banks**

The evidence suggests that specific features of corporate governance and risk management play a role in driving banks' behaviour (Aebi et al., 2012; Bonaccorsi et al., 2014). However in the aftermath of the 2008 financial crisis, the appropriateness of risk management practices was argued to be more a matter of "culture" than of the specific deficiencies of the formal risk management framework.

Risk management is about identifying possible risk profiles, communicating them to the board or to the CEO and monitoring the implementation of the risk appetite, but it not about taking decisions (Stulz, 2014).

The risk behaviour of a bank is the result of decisions made at different organizational levels and representing a synthesis of the people's values (for example, an excessive risk position

could come from a moral hazard behavior of the CEO, who is willing to increase short-term returns).

Risk culture is therefore a broad concept that refers to implicit and explicit contracts governing the risk behavior within an organization. It is how people's underlying assumptions concretize in norms, values and artifacts (Schein, 1990). Assumptions are based on what is considered to be the right way of perceiving, thinking, feeling and acting. Not all the assumptions are relevant for the risk culture, but only those that affect *"the way in which [persons] identify, understand, discuss, and act on the risks"* (International Institute of Finance, 2009, p. 31). Values are based on prior learning, shared throughout the organization and influencing the way it manages / assumes risks. If values were not based on prior learning, organization members would find it irrational to do something that contradicts their basic assumptions. Artifacts, the tangible signs within the organization, represent the third level.

Financial institutions' risk culture is therefore related to *"risk awareness, risk taking and risk management and controls that shape decisions on risks [...] during the day-to-day activities and have an impact on the risks they assume"* (Basel Committee for Banking Supervisions, 2015, p. 2).

Financial Stability Board (2014) produced a risk cultural framework as a synthesis of various approaches (e.g., Cass Business School and New City Agenda, 2014; Institute of Risk Management, 2012; Senior Supervisors Group, 2009; McKinsey; KPMG). This framework refers to 4 main attributes of a sound risk culture: i) tone from the top, ii) accountability, iii) challenge and effective communication and iv) incentives.

The first element of FSB's scheme is tone from the top: board and senior management have the responsibility to promote risk culture and include it in the strategy. The top members of the organization oversee the development of an adequate risk culture and create mechanisms for the implementation of Risk Appetite to all levels of the organization.

Risk should "matter" in the company. Indeed, the second required quality is accountability, which just adequate governance and transparency can develop. The organization has to develop competences that allow recognizing risk and escalation processes (as whisper blowing) to communicate potential threats. Furthermore, consequences of a risk-taking not aligned with risk appetite (regardless the financial result of the action) have to be clear, articulated and applied.

An intense flow of information, provided by adequate tools and mechanisms, is not effective without an open communication culture inside the organization; top management must encourage alternative views and pay attention to the risk management's observations. This is what an effective communication and challenge refers to the possibility to take informed risk decisions.

Behaviors and decisions need to be encouraged by appropriate incentives. The organization needs a system of rewards and penalties linked with the risk performance, which has to include all individuals from the CEO down to the bank's loan officers. However, the incentives have not to be just monetary; companies must rely also on training, job rotation and successions planning to develop risk culture.

Therefore, to analyze if the costs imposed to banks in developing a sound risk culture are justified, we try to investigate if SRC is associated with banks' performance and stability and what are the SRC attributes that matter the more.

### **3. Data and Variables**

The most challenging task of this paper is the development of the SRCI, i.e. a new measurable indicator of the risk culture. To this aim we used quantitative text analysis that has proved to be a reliable methodology in previous works on organizational culture (Carretta et al., 2015; Carretta et al., 2010).

The construction of the SRCI follows three steps, in the first step we selected different vectors of words that capture SRC's attributes, in the second step, we need to identify appropriate company's documents where we believe the risk culture is mirrored. Finally, we define the equation used to compute SRCI.

Regarding the first step, FSB's framework looks at 4-attributes which constitutes a SRC: Tone-from-the-Top (TFT), Accountability (ACC), Open and Effective Communication (COM) and Incentives (INC). For each one of them it specifies different qualities that help to identify what each attribute consist in; it calls them "indicators" (Appendix I provides all the indicators and the extracted terms in Table I.1). We chose the words from the FSB's indicators' description. To better measure such qualities in the banks' vocabulary, we do not merely choose single words from FSB's text but consider also combinations of two and three terms. For example, the words "board" and "lead" stand-alone would be not sufficient to identify the leadership attitude of the

board (ID 4.1.a in Table I.1), but these words taken together show a guidance role of the board. Consequently, in the QTA we used “vectors of words” which can contain from one up to three terms. The vectors of words directly selected from FSB framework are reported in the Table I.1 of Appendix I: each coma-separated-term in the first group is searched with each term of the second group (in the column “Extracted Sentences”). As clarified after, in the QTA algorithm, we look if words belonging to the name vector appear together in a sentence. These vectors are thereafter labeled as “Groups Meaning-Units” (GMUs). Up to this point, each extracted GMUs express a certain meaning and they are used to look for this meaning in the text. Although, the same concept can be stated in different ways; not just with the words included in the GMUs. To go beyond this limit, our methodology includes new GMUs, these are composed by synonymous of each original chosen term taken from the Thesaurus Collins Dictionary (in Table I.2, Appendix I, is provided a table with the dailies of the chosen and discarded synonyms). In all the GMUs we include not the terms themselves, but their roots, cleaning out all morphological affixes thanks to a Porter’s stemming algorithm implemented in the Python’s SnowballStemmer package. To deal with the duplicated GMUs we apply the following rule: when duplicates belong to the same attribute we keep just one of them; if they refer to different attributes we delete both. The final result is 9361 GMUs considered, Table I.3 in Appendix I reports all of them.

In the second step, we decide to analyze annual, corporate governance and Pillar 3 reports. They are the one with the higher numbers information about respectively performance, risk and internal policies. These documents are partially regulated by the European Banking Authority (EBA), but banks can decide documents’ detail and length. The lack of standardization can cause errors in the analysis: we deal this problem, as explained later, deleting observations with low number of words and correcting the SRCI by the lengths of the document.

To perform text analysis, we used Python’s nltk package implanted in an algorithm specifically created. The software allows counting how many time GMUs appear in the banks’ disclosure. It divides the text into sentences (consecutive words contained between a blank line and a dot or between two dots) and adds one to the count if the sentence contains the GMU.

Finally, in the third step we compute SRCI and TFT, ACC, COM, INC’s indicators as:

$$(1) \quad TFT_{it}^{yc} = \frac{TFT_{it} - \overline{TFT}_{jt}}{sdTFT_{jt}}$$

$$(2) \quad ACC_{it}^{yc} = \frac{ACC_{it} - \overline{ACC}_{jt}}{sdACC_{jt}}$$

$$(3) \quad COM_{it}^{yc} = \frac{COM_{it} - \overline{COM}_{jt}}{sdCOM_{jt}}$$

$$(4) \quad INC_{it}^{yc} = \frac{INC_{it} - \overline{INC}_{jt}}{sdINC_{jt}}$$

$$(5) \quad SRCI_{it}^{yc} = \frac{SRCI_{it} - \overline{SRCI}_{jt}}{sdSRCI_{jt}}$$

Where:

$$(6) \quad TFT_{it} = \frac{N_{it}^{TFT}}{tphr_{it}}$$

$$(7) \quad ACC_{it} = \frac{N_{it}^{ACC}}{tphr_{it}}$$

$$(8) \quad COM_{it} = \frac{N_{it}^{COM}}{tphr_{it}}$$

$$(9) \quad INC_{it} = \frac{N_{it}^{INC}}{tphr_{it}}$$

$$(10) \quad SRCI_{it} = TFT_{it} + ACC_{it} + COM_{it} + INC_{it}$$

$N_{it}^{TFT}$ ,  $N_{it}^{ACC}$ ,  $N_{it}^{COM}$  and  $N_{it}^{INC}$  are the total number of sentences containing a GMUs associated with the correspondent indicator (Tone-From-the-Top, Accountability, Communication, and Incentives) for the bank  $i$ 's disclosure at time  $t$ .  $tphr_{it}$  is the total number of sentences in the bank-  $i$ 's disclosure at time  $t$ . Dividing by total number of sentences corrects indicator for the distortions due to a longer or shorter bank's disclosure. Disclosure content can be affected by country's regulation and exogenous annual events which not give information about the specific bank's SRC and which can distort the indicator. To correct for those distortions, we standardize by year and country:  $\overline{SRCI}_{jt}$ ,  $\overline{TFT}_{jt}$ ,  $\overline{ACC}_{jt}$ ,  $\overline{INC}_{jt}$  are the mean of  $TFT_{it}$ ,  $ACC_{it}$ ,  $COM_{it}$ ,  $INC_{it}$  and  $SRCI_{it}$  in year  $t$  and for country  $j$ , while  $sdSRCI_{jt}$ ,  $sdTFT_{jt}$ ,  $sdACC_{jt}$ ,  $sdCOM_{jt}$ ,  $sdINC_{jt}$  are the correspondent standard-deviations.

The sample includes the bigger banks in the Euro-zone and UK, active among 2004 and 2014, both listed and not listed. Listed banks' names were obtained from *Datastream* while not listed institutions are taken from the register of Significant Supervised Entities (SSE) published by BCE. The total sample includes 247 banks, but just 147 have at least one document in English. The analysis focuses on big banks because they are the ones that showed particular problems in guaranteeing a common risk culture through all the organization. The banks

considered include around the 67% of the Eurozone Bank's total asset<sup>1</sup>. Total number of observation is 1051. Balance sheet data are taken from *BankScope* database.

Graph 1 shows the distribution of total number of words (*tw*) present in each banks' annual disclosure. We define *word* all terms with more than two letters that are not an article or a conjunction. It has an anomalous pick near zero, probably due to failures in document's text analysis. To clean the data, we kept just observation with more than 10000 words; the number of observations drops to 959 (Table1).

**[Figure 1 goes here]**

**[Table 1a and 1b goes here]**

Table 1a and 1b provide some descriptive statistics of the sample, when standardized by year and country all SRC's indicators have mean zero. Z-score (*Z*), gross loans on total assets (TL/TA), total asset (TA), impaired loans on gross loans (IMP/L), Tier 1 Ratio (T1RATIO) and risk weighted assets on total assets (RWA/TA) and profit before tax on RWA (GI/RWA) show all high and low maximum and minimum values with respect with their 1<sup>st</sup> and 99<sup>th</sup> percentile. Z-score is computes as:

$$(11) \quad Z_{it} = \frac{ROA_{it} + \frac{E_{it}}{TA_{it}}}{sdROA_t}$$

Where  $E_{it}$  and  $TA_{it}$  are total equity and total assets of bank  $i$  in year  $t$  and  $sdROA_t$  is the standard deviation of ROA in the year. The presence of outliers in all the variables is probably due to errors and extreme chases (e.g. minimum value of RWA/TA is negative while maximum value of TL/TA is more than one). For this reason, we decided to winsorized at 1% the variables (Barnett & Lewis, 1994). The last rows of Table 1a and 1b report the correlation among variables: SRC's attributes seem to influence each other, since correlation between them is high. For example, correlation between TFT and ACC is 0.76, this means that a good Tone-from-the-Top is frequently associated to bank's attention to risk (Accountability). This probably happens because banks that develop one of the SRC's components tend to develop also the other three ones; indeed, literature on organizational culture shows that all dimension of culture are interlocked. Still, in the following analysis, we analyze the role of each component on dependent variables alone, to study which one is more effective. Graph 6 shows the 4-factors' mean

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<sup>1</sup> Aggregated balance sheet of euro area monetary financial institutions, excluding the Eurosystem August 2016



computed on the whole period by country, it is visible the lower values of Greece and UK banks (as one could aspects because of Greek public debt crisis and of LIBOR scandal).

[Figure 2 goes here]

#### 4. Methods and Results

First of all, we run a preliminarily investigation to assess the economic meaning of our new risk culture measures. Specifically, we run a difference in mean t-tests focusing on various variables on two subsample of banks: banks with the strongest risk culture (i.e. the ones in the first quartile of the  $SRCI_{it}^{yc}$  distribution) and the weakest risk culture (i.e. the ones in the fourth quartile of the  $SRCI_{it}^{yc}$  distribution). We show that an higher SRC is associated with higher return: the group with higher SRC has a ROE 6% higher, this difference is significant at 1%. Banks with a SRC are generally bigger, with an lower incidence of equity on total assets. Futhermore, a SRC is associated with lower risk, the group with higher SRC has a lower RWA/TA and loan provvision on gross loans (LLP/TL).

[Table 2 goes here]

In the analysis we estimate the following regression model:

$$(12) \quad \ln(Z_{it}) = \sum_t \alpha_t + \sum_i \alpha_i + SRCI_{it}^{yc} \beta_1 + \frac{TL_{it}}{TA_{it}} \beta_2 + \ln(TA_{it}) \beta_3 + crisis_i \beta_4 + \epsilon_{it}$$

$$(13) \quad \ln(Z_{it}) = \sum_t \alpha_t + \sum_i \sum_j \alpha_i * \alpha_j + SRCI_{it}^{yc} \beta_1 + \frac{TL_{it}}{TA_{it}} \beta_2 + \ln(TA_{it}) \beta_3 + crisis_i \beta_4 + \epsilon_{it}$$

Where  $\ln(Z_{it})$  is the natural logarithm of the Z-score computed as in Equation (11),  $\alpha_t$  and  $\alpha_i$  are the year-fixed-effect and the bank-fixed effect,  $SRCI_{it}^{yc}$  is the SRCI defined in Equation (10) and  $crisis_i$  is a dummy with value 1 if  $i \geq 2008$ . In Equation (13) we estimate the same model but adding country fixed effects (to avoid collinearity we multiply it by the year-fixed-effect). We repeated the analysis for different dependent variables: IMP/L, LLP/L, T1RATIO, RWA/TA and ROE.

Table 3 provides results of Equation (12) and (13) together with the ones of the same model computed on LLP/L and IMP/L, we can see that a higher SRC is associated with a lower risk in bank's loans portfolio, in column (3) the SRCI coefficient is negative (meaning that banks with a higher SRC need less provision on loss loans) and significant at 5% (in the first model) and at 1% (in the second). The SRCI is also negatively correlated with the portion of impaired loans on gross loans, the  $\beta$  is negative and high in absolute value, but it is significant just at 10% (and only when country effects are added to the controls). The regression on  $\ln(Z_{it})$  shows the same evidences, the coefficient is significant at 10% but just with country-controls. Table 4 reports the results of same models with T1RATIO, RWA/TA and GI/RWA as dependent variables. SRC seems to not have any effect on capitalization and bank's general risk, while highly significant positive effect on GI/RWA. Table 5 show the result on ROE, the effect of SRCI is highly significant, this last result is the most surprising, in both the models the SRCI have a high impact on ROE, an increase of one point corresponds to an increase of the ROE around 6%.

**[Tables 3-5 go here]**

Table 6-12 estimate the model in Equation (13) but substituting  $TFT_{it}^{yc}$ ,  $ACC_{it}^{yc}$ ,  $COM_{it}^{yc}$  and  $INC_{it}^{yc}$  to  $SRCI_{it}^{yc}$  (tables include, respectively, results of regressions on  $\ln(Z_{it})$ , IMP/L, LLP/L, T1RATIO, RWA/TA, ROE and GI/RWA).  $TFT_{it}^{yc}$ ,  $ACC_{it}^{yc}$ ,  $COM_{it}^{yc}$  and  $INC_{it}^{yc}$  are the indicator for each one of the 4 SRC's attributes defined by FSB; due to the high correlation between them (Table 1a) we considered each one at a time. In Table 6 the dependent variable is  $\ln(Z_{it})$  and each column shows the results of the regression with one of the 4 indicators. TFT and COM have  $\beta$ s equal to 0.12 and 0.114, they are both positive and significant at 5%. In Table 7, just TFT has a significant impact at 5% on IMP/L, indeed COM is significant at 10%. In Table 8 we can see that all 4-attributes-indicators have a highly significant impact on ratio of loan loss provisions on gross loans, the  $\beta$ s are all equal to -0.003 and with a p-value lower than 1%. Table 9 and 10 reports the regressions on T1RATIO and RWA/TA, the results generally confirm that SRC has no impact on banks' capitalization and general risk: all 4-attributes-indicators are not significant. In Table 11 all 4-attributes have a high significant impact on ROE, while in Table 12 just TFT, ACC and COM show a significant effect.

[Tables from 6 to 12 go here]

## 5. Conclusion

There is a lack of empirical works on the role of risk culture in financial institutions. The main challenge for scholars is to develop a reliable measure of a “soft” variable. The Financial Stability Board (2014) creates a framework centered not in evaluating risk culture itself but in identifying attributes that allow the development of the right risk culture for the bank. Such qualities take the name of sound risk culture (SRC).

Following FSB’s framework, we first develop the *Sound Risk Culture Indicator (SRCI)*. It is computed as the sum of four indicators, one for each of the four attributes that composes a SRC and obtained via quantitative text analysis of annual, corporate governance and Pillar 3 reports. Then we evaluate if the SRCI is associated with performance and stability of our sample of 147 European commercial banks, during the 2004 - 2014 period.

The analysis shows that the four attributes influence each other, they correlate with each other (all above 0.7). This study applies a regression model with annual and bank fixed effects. In the regressions we controlled for bank’s dimensions and its focus on credit activity (measured by TL/L), crisis effects (using a dummy with value 1 in 2008 and after) and country effects (including country-dummies). Dependent variables are Z-score (obtained as the ratio between the ROA plus the leverage and the standard deviation of the ROA in the year), impaired loans and loss provisions on gross loans, Tier 1 ratio and Risk weighted assets on total assets. Since the 4 attributes indicators are highly correlated, we first estimated the regression model before with SRCI and then with each indicator, one at the time. The main result is that a higher SRC is correlated with a higher bank’s ability to manage its loan portfolio; indeed, in all regression SRCI has a significant negative impact on loan loss provision on gross loans. This result is confirmed also by the fact that a higher Tone-from-the Top is significantly correlated with a lower incidence of impaired loans on total loans (with a p-value of lower than 5%). This last result confirms the main role of Tone-from-the-Top stated by previous reports on RC. Analysis shows also some evidences that SRC is associated with a higher stability: SRCI’s  $\beta$  is significant at 10% on the natural logarithm of the Z-score and the TFT’s one at 5%. In all regression we see no impact on T1RATIO or on RWA/TA, meaning that SRC have no impact on general banks’ risk or on capitalization. The high correlation among the 4 attributes indicators means that the

four SRC dimensions are highly interlocked. Unexpectedly, SRC has also a high positive impact on return, an increase of one point of SRCI increase ROE of 6%.

In the light of these results, industry efforts on developing banks' RC seem to be justified. Moreover, FSB's framework captures important dimension of what should be a sound risk culture. In particular, our results confirm that Tone-from-the-Top is an important driver of a SRC: Board and Senior Management have the responsibility to push their firms in dealing with efficient risk-taking and should develop a SRC which allows to higher returns for the bank.

Further researches could extend the analysis to other geographic areas. In particular, since US's financial institutions provide a more standardized disclosure, quantitative text analysis could be more accurate and provide clearer results.

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**Table 1a Descriptive Statistics and Correlations**

	SRCI	TFT	ACC	COM	INC	TL/TA	TA(mil)	IMP/L
N	959	959	959	959	959	1301	1312	1042
mean	0,00	0,00	0,00	0,00	0,00	0,56	226991	0,07
sd	0,42	0,42	0,42	0,42	0,42	0,21	420503	0,08
min	-0,86	-0,85	-0,85	-0,82	-0,84	0,01	2	0,00
p1	-0,81	-0,80	-0,81	-0,79	-0,80	0,03	352	0,00
p5	-0,71	-0,71	-0,71	-0,71	-0,71	0,16	857	0,01
p10	-0,62	-0,60	-0,64	-0,60	-0,58	0,24	2041	0,01
p50	-0,03	-0,03	-0,03	-0,05	-0,03	0,60	43828	0,04
p90	0,64	0,66	0,62	0,71	0,68	0,79	678453	0,16
p95	0,71	0,71	0,71	0,73	0,71	0,83	1226307	0,23
p99	0,81	0,81	0,82	0,82	0,80	0,90	1965283	0,43
max	0,91	0,91	0,91	0,86	0,91	1,07	2586701	0,57
SRCI	1,00	.	.	.	.	.	.	.
TFT	0,90	1,00	.	.	.	.	.	.
ACC	0,86	0,74	1,00	.	.	.	.	.
COM	0,70	0,71	0,52	1,00	.	.	.	.
INC	0,70	0,56	0,78	0,32	1,00	.	.	.
TL/TA	-0,08	-0,10	-0,03	-0,07	-0,06	1,00	.	.
TA(mil)	0,12	0,15	0,11	0,04	0,06	-0,37	1,00	.
IMP/L	-0,04	-0,06	-0,02	-0,07	-0,02	0,32	-0,16	1,00

**Table 2b Descriptive Statistics and Correlations**

	SRCI	TFT	ACC	COM	INC	Z	T1RATIO	RWA/TA	GI/RWA
N	959	959	959	959	959	1307	1097	1015	1012
mean	0,00	0,00	0,00	0,00	0,00	0,51	11,75	0,69	-0,01
sd	0,42	0,42	0,42	0,42	0,42	0,60	8,23	5,81	0,50
min	-0,86	-0,85	-0,85	-0,82	-0,84	-0,57	-6,10	-0,53	-15,72
p1	-0,81	-0,80	-0,81	-0,79	-0,80	-0,10	5,30	0,08	-0,17
p5	-0,71	-0,71	-0,71	-0,71	-0,71	0,08	6,50	0,18	-0,04
p10	-0,62	-0,60	-0,64	-0,60	-0,58	0,12	7,00	0,23	-0,02
p50	-0,03	-0,03	-0,03	-0,05	-0,03	0,36	10,48	0,50	0,01
p90	0,64	0,66	0,62	0,71	0,68	0,99	16,20	0,78	0,03
p95	0,71	0,71	0,71	0,73	0,71	1,43	19,90	0,84	0,04
p99	0,81	0,81	0,82	0,82	0,80	3,04	45,50	0,92	0,09
max	0,91	0,91	0,91	0,86	0,91	7,00	110,10	185,58	0,28
SRCI	1,00	.	.	.	.	.	.	.	.
TFT	0,90	1,00	.	.	.	.	.	.	.
ACC	0,87	0,75	1,00	.	.	.	.	.	.
COM	0,73	0,73	0,53	1,00	.	.	.	.	.
INC	0,70	0,57	0,79	0,36	1,00	.	.	.	.
Z	-0,06	-0,07	-0,07	0,04	-0,05	1,00	.	.	.
T1RATIO	0,00	-0,05	0,00	0,02	0,05	0,16	1,00	.	.
RWA/TA	-0,04	-0,04	-0,04	-0,03	-0,04	-0,01	-0,02	1,00	.
GI/RWA	0,00	0,00	0,00	0,04	0,00	0,33	-0,15	-0,01	1,00

**Table 2 Descriptive Statistics and Correlations**

SRCI	1 <sup>st</sup> Quartile	4 <sup>th</sup> Quartile	Difference	(p-value)
ROA	-0.00	0.00	-0.00	0.03
ROE	-0.01	0.05	-0.06	0.01
Eq/TA	0.07	0.06	0.01	0.00
TA(ml)	146,628	298,519	-151,891	0.00
IMP/TL	0.08	0.07	0.01	0.26
Z	11.27	9.93	1.34	0.52
T1RATIO	11.69	11.28	0.41	0.46
DEP/LTF	22.48	20.58	1.90	0.72
SEC/TA	0.25	0.25	-0.00	0.87
LIQ/TA	0.23	0.25	-0.01	0.46
RWA/TA	0.55	0.49	0.06	0.01
GI_RWA	0.01	0.01	-0.00	0.86
LP/TL	0.01	0.01	0.00	0.08



**Table 3 Effect of Sound Risk Culture Indicator on Z-score, Impaired Loan and Loan Loss Provisions**

	Y=ln(Z)		y=(IMP/L)		y=(LLP/L)	
	(1)	(2)	(3)	(4)	(5)	(6)
SRCI <sub>it</sub>	0.035 [0.070]	0.076 [0.043]*	-0.010 [0.011]	-0.014 [0.008]*	-0.003 [0.001]**	-0.003 [0.001]**
lnTA	-0.576 [0.091]***	-0.500 [0.136]***	0.003 [0.015]	0.009 [0.013]	0.002 [0.002]	0.001 [0.002]
TL/TA	-0.106 [0.320]	0.535 [0.518]	0.010 [0.050]	-0.014 [0.032]	0.006 [0.007]	0.002 [0.007]
crisis	-0.429 [0.053]***	0.734 [0.128]***	0.053 [0.009]***	0.328 [0.049]***	0.008 [0.001]***	0.012 [0.005]**
cons	9.506 [1.549]***	7.214 [2.525]***	-0.027 [0.253]	-0.362 [0.246]	-0.028 [0.032]	-0.028 [0.035]
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time*State FE	No	Yes	No	Yes	No	Yes
<i>N</i>	866	866	740	740	875	875
<i>R</i> <sup>2</sup>	0.22	0.82	0.14	0.84	0.11	0.64
<i>R</i> <sub>adj</sub> <sup>2</sup>	0.21	0.78	0.14	0.80	0.11	0.56

Regression (1) estimates the effect of SRCI as computed as  $SRCI_{it}^{yc} = \frac{SRCI_{it} - \overline{SRCI}_{jt}}{sdSRCI_{jt}}$  on natural logarithm of Z-score (lnZ) controlling for the natural logarithm of total assets (lnTA), Gross loans on Total Assets (TL/TA), crisis (a dummy with value 1 from 2008 and after) and a constant. Regression (2) adds the product of dummy variables per year and country. Regressions (3) and (4) perform the same regression models but this time on impaired loans on gross loans (IMP/L), and Regressions (5) and (6) on loans loss provisions on gross loans (LLP/L). In all the models we cluster standard errors at firm levels. In brackets are reported standard deviations and stars corresponds to the following p-value's levels: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Table 4 Effect of Sound Risk Culture Indicator on Tier 1 Ratio, Risk Weighted Assets on Total Assets and Profit Before Tax on Risk Weighted Assets**

	T1RATIO		RWA/TA		GI/RWA	
	(1)	(2)	(3)	(4)	(5)	(6)
SRCI <sub>it</sub>	0.535 [0.570]	0.043 [0.530]	0.001 [0.012]	0.013 [0.014]	0.005 [0.003]*	0.006 [0.003]**
lnTA	-2.715 [1.159]**	-2.701 [1.302]**	-0.054 [0.031]*	-0.094 [0.048]*	0.010 [0.006]*	0.007 [0.008]
TL/TA	-9.524 [3.586]***	-7.494 [3.960]*	0.604 [0.083]***	0.449 [0.077]***	-0.019 [0.019]	-0.024 [0.021]
crisis	3.166 [0.475]***	12.742 [2.538]***	-0.055 [0.013]***	-0.224 [0.067]***	-0.021 [0.003]***	-0.005 [0.003]
cons	62.866 [21.749]***	54.528 [25.268]**	1.189 [0.558]**	2.116 [0.895]**	-0.143 [0.103]	-0.095 [0.144]
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time*State FE	No	Yes	No	Yes	No	Yes
<i>N</i>	771	771	722	722	720	720
<i>R</i> <sup>2</sup>	0.12	0.57	0.32	0.59	0.13	0.67
<i>R</i> <sub>adj</sub> <sup>2</sup>	0.11	0.47	0.31	0.49	0.13	0.58

Regression (1) estimates the effect of SRCI as computed as  $SRCI_{it}^{yc} = \frac{SRCI_{it} - \overline{SRCI}_{jt}}{sdSRCI_{jt}}$  on Tier 1 Ratio (Tier 1 on Risk weighted Assets) controlling for the natural logarithm of total assets (lnTA), Gross loans on Total Assets (TL/TA), crisis (a dummy with value 1 from 2008 and after) and a constant. Regression (2) adds the product of dummy variables per year and country. Regressions (3), (4), (5) and (6) perform the same regression models but this time on Tier 1 on RWA, RWA on Total Assets (RWA/TA) and profit before tax on RWA (GI/RWA). In all the models we cluster standard errors at firm levels. In brackets are reported standard deviations and stars corresponds to the following p-value's levels: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Table 5 Effect of Sound Risk Culture Indicator on Return on Equity**

	ROE	
	(1)	(2)
SRCIcy	0.058 [0.019]***	0.062 [0.016]***
lnTA	0.051 [0.020]**	0.028 [0.025]
TL/TA	-0.138 [0.117]	-0.069 [0.122]
crisis	-0.173 [0.018]***	-0.113 [0.044]**
cons	-0.661 [0.316]**	-0.326 [0.416]
Firm FE	Yes	Yes
Time*State FE	No	Yes
<i>N</i>	884	884
<i>R</i> <sup>2</sup>	0.13	0.51
<i>R</i> <sub>adj</sub> <sup>2</sup>	0.12	0.41

Regression (1) estimates the effect of SRCI as computed as  $SRCI_{it}^{yc} = \frac{SRCI_{it} - \overline{SRCI}_{jt}}{sdSRCI_{jt}}$  on ROE controlling for the natural logarithm of total assets (lnTA), Gross loans on Total Assets (TL/TA), crisis (a dummy with value 1 from 2008 and after) and a constant. In brackets are reported standard deviations and stars corresponds to the following p-value's levels: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Table 6 Effect of Tone-from-the-Top, Accountability, Communication and Incentives' indicators on Z-score**

	Ln(Z)			
	(1)	(2)	(3)	(4)
TFTcy	0.102 [0.042]**			
ACCcy		0.087 [0.048]*		
COMcy			0.114 [0.045]**	
INCcy				0.068 [0.053]
lnTA	-0.506 [0.139]***	-0.505 [0.140]***	-0.508 [0.140]***	-0.504 [0.141]***
TL/TA	0.619 [0.571]	0.607 [0.574]	0.647 [0.570]	0.604 [0.574]
crisis	-2.594 [0.120]***	-2.592 [0.127]***	-2.589 [0.133]***	-2.576 [0.124]***
cons	12.351 [2.578]***	12.354 [2.587]***	12.367 [2.599]***	12.319 [2.609]***
Firm FE	Yes	Yes	Yes	Yes
Time*State FE	Yes	Yes	Yes	Yes
<i>N</i>	864	864	864	864
<i>R</i> <sup>2</sup>	0.90	0.90	0.90	0.90
<i>R</i> <sub>adj</sub> <sup>2</sup>	0.88	0.88	0.88	0.88

Regressions (1), (2), (3) and (4) estimate the effect of, respectively,  $TFT_{it}^{yc} = \frac{TFT_{it} - \overline{TFT}_{jt}}{sdTFT_{jt}}$ ,  $ACC_{it}^{yc} = \frac{ACC_{it} - \overline{ACC}_{jt}}{sdACC_{jt}}$ ,  $COM_{it}^{yc} = \frac{COM_{it} - \overline{COM}_{jt}}{sdCOM_{jt}}$  and  $INC_{it}^{yc} = \frac{INC_{it} - \overline{INC}_{jt}}{sdINC_{jt}}$  on natural logarithm of Z-score (lnZ) controlling for the natural logarithm of total assets (lnTA), Gross loans on Total Assets (TL/TA), crisis (a dummy with value 1 from 2008 and after), a constant and add the product of dummy variables per year and country. In all the models we cluster standard errors at firm levels. In brackets are reported standard deviations and stars corresponds to the following p-value's levels: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Table 7 Effect of Tone-from-the-Top, Accountability, Communication and Incentives' indicators on Impaired Loans on Total Loans**

	IMP/L			
	(1)	(2)	(3)	(4)
TFTcy	-0.017 [0.008]**			
ACCcy		-0.014 [0.010]		
COMcy			-0.012 [0.007]*	
INCcy				-0.010 [0.009]
lnTA	0.009 [0.013]	0.009 [0.013]	0.009 [0.013]	0.009 [0.013]
TL/TA	-0.015 [0.032]	-0.014 [0.032]	-0.015 [0.032]	-0.012 [0.032]
crisis	0.328 [0.052]***	0.329 [0.049]***	0.326 [0.045]***	0.327 [0.048]***
cons	-0.364 [0.246]	-0.370 [0.245]	-0.358 [0.244]	-0.365 [0.244]
Firm FE	Yes	Yes	Yes	Yes
Time*State FE	Yes	Yes	Yes	Yes
<i>N</i>	740	740	740	740
<i>R</i> <sup>2</sup>	0.84	0.84	0.84	0.84
<i>R</i> <sub>adj</sub> <sup>2</sup>	0.81	0.80	0.80	0.80

Regressions (1), (2), (3) and (4) estimate the effect of, respectively,  $TFT_{it}^{yc} = \frac{TFT_{it} - \overline{TFT}_{jt}}{sdTFT_{jt}}$ ,  $ACC_{it}^{yc} = \frac{ACC_{it} - \overline{ACC}_{jt}}{sdACC_{jt}}$ ,  $COM_{it}^{yc} = \frac{COM_{it} - \overline{COM}_{jt}}{sdCOM_{jt}}$  and  $INC_{it}^{yc} = \frac{INC_{it} - \overline{INC}_{jt}}{sdINC_{jt}}$  on impaired loans on total loans (IMP/L) controlling for the natural logarithm of total assets (lnTA), Gross loans on Total Assets (TL/TA), crisis (a dummy with value 1 from 2008 and after), a constant and add the product of dummy variables per year and country. In all the models we cluster standard errors at firm levels. In brackets are reported standard deviations and stars corresponds to the following p-value's levels: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Table 8 Effect of Tone-from-the-Top, Accountability, Communication and Incentives' indicators on Loan Loss Provision on Gross Loans**

	LLP/L			
	(1)	(2)	(3)	(4)
TFTcy	-0.003 [0.001]***			
ACCcy		-0.003 [0.001]***		
COMcy			-0.003 [0.001]***	
INCcy				-0.003 [0.001]**
lnTA	0.001 [0.002]	0.001 [0.002]	0.001 [0.002]	0.001 [0.002]
TL/TA	0.002 [0.006]	0.003 [0.007]	0.002 [0.006]	0.003 [0.006]
crisis	0.013 [0.005]**	0.012 [0.005]**	0.012 [0.004]***	0.012 [0.005]**
cons	-0.029 [0.034]	-0.028 [0.035]	-0.025 [0.034]	-0.025 [0.035]
Firm FE	Yes	Yes	Yes	Yes
Time*State FE	Yes	Yes	Yes	Yes
<i>N</i>	875	875	875	875
<i>R</i> <sup>2</sup>	0.64	0.64	0.64	0.64
<i>R</i> <sub>adj</sub> <sup>2</sup>	0.57	0.56	0.57	0.56

Regressions (1), (2), (3) and (4) estimate the effect of, respectively,  $TFT_{it}^{yc} = \frac{TFT_{it} - \overline{TFT}_{jt}}{sdTFT_{jt}}$ ,  $ACC_{it}^{yc} = \frac{ACC_{it} - \overline{ACC}_{jt}}{sdACC_{jt}}$ ,  $COM_{it}^{yc} = \frac{COM_{it} - \overline{COM}_{jt}}{sdCOM_{jt}}$  and  $INC_{it}^{yc} = \frac{INC_{it} - \overline{INC}_{jt}}{sdINC_{jt}}$  on the ratio between loan loss provision and total loans (LLP/TL) controlling for the natural logarithm of total assets (lnTA), Gross loans on Total Assets (TL/TA), crisis (a dummy with value 1 from 2008 and after), a constant and add the product of dummy variables per year and country. In all the models we cluster standard errors at firm levels. In brackets are reported standard deviations and stars corresponds to the following p-value's levels: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Table 9 Effect of Tone-from-the-Top, Accountability, Communication and Incentives' indicators on Tier 1 Ratio**

	TIRATIO			
	(1)	(2)	(3)	(4)
TFTcy	-0.050 [0.550]			
ACCcy		0.108 [0.478]		
COMcy			0.145 [0.406]	
INCcy				-0.037 [0.534]
lnTA	-2.699 [1.299]**	-2.700 [1.302]**	-2.692 [1.308]**	-2.704 [1.302]**
TL/TA	-7.495 [3.953]*	-7.477 [3.958]*	-7.448 [3.978]*	-7.499 [3.954]*
crisis	12.761 [2.579]***	12.727 [2.508]***	12.733 [2.528]***	12.751 [2.580]***
cons	54.471 [25.198]**	54.507 [25.271]**	54.334 [25.388]**	54.579 [25.282]**
Firm FE	Yes	Yes	Yes	Yes
Time*State FE	Yes	Yes	Yes	Yes
<i>N</i>	771	771	771	771
<i>R</i> <sup>2</sup>	0.57	0.57	0.57	0.57
<i>R</i> <sub>adj</sub> <sup>2</sup>	0.47	0.47	0.47	0.47

Regressions (1), (2), (3) and (4) estimate the effect of, respectively,  $TFT_{it}^{yc} = \frac{TFT_{it} - \overline{TFT}_{jt}}{sdTFT_{jt}}$ ,  $ACC_{it}^{yc} = \frac{ACC_{it} - \overline{ACC}_{jt}}{sdACC_{jt}}$ ,  $COM_{it}^{yc} = \frac{COM_{it} - \overline{COM}_{jt}}{sdCOM_{jt}}$  and  $INC_{it}^{yc} = \frac{INC_{it} - \overline{INC}_{jt}}{sdINC_{jt}}$  on Tier 1 Ratio (TIRATIO), computed as the ratio between Tier 1 and RWA controlling for the natural logarithm of total assets (lnTA), Gross loans on Total Assets (TL/TA), crisis (a dummy with value 1 from 2008 and after), a constant and add the product of dummy variables per year and country. In all the models we cluster standard errors at firm levels. In brackets are reported standard deviations and stars corresponds to the following p-value's levels: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Table 10 Effect of Tone-from-the-Top, Accountability, Communication and Incentives' indicators on Risk-Weighted-Assets on Total Loans**

	RWA/TA			
	(1)	(2)	(3)	(4)
TFTcy	0.016 [0.014]			
ACCcy		0.005 [0.013]		
COMcy			0.012 [0.014]	
INCcy				-0.003 [0.014]
lnTA	-0.094 [0.048]*	-0.094 [0.048]*	-0.093 [0.048]*	-0.094 [0.048]*
TL/TA	0.449 [0.076]***	0.449 [0.077]***	0.451 [0.078]***	0.448 [0.076]***
crisis	-0.225 [0.070]***	-0.222 [0.064]***	-0.222 [0.063]***	-0.221 [0.061]***
cons	2.121 [0.892]**	2.114 [0.894]**	2.099 [0.900]**	2.117 [0.897]**
Firm FE	Yes	Yes	Yes	Yes
Time*State FE	Yes	Yes	Yes	Yes
<i>N</i>	722	722	722	722
<i>R</i> <sup>2</sup>	0.59	0.59	0.59	0.59
<i>R</i> <sub>adj</sub> <sup>2</sup>	0.49	0.48	0.49	0.48

Regressions (1), (2), (3) and (4) estimate the effect of, respectively,  $TFT_{it}^{yc} = \frac{TFT_{it} - \overline{TFT}_{jt}}{sdTFT_{jt}}$ ,  $ACC_{it}^{yc} = \frac{ACC_{it} - \overline{ACC}_{jt}}{sdACC_{jt}}$ ,  $COM_{it}^{yc} = \frac{COM_{it} - \overline{COM}_{jt}}{sdCOM_{jt}}$  and  $INC_{it}^{yc} = \frac{INC_{it} - \overline{INC}_{jt}}{sdINC_{jt}}$  on the ratio between RWA and total loans controlling for the natural logarithm of total assets (lnTA), Gross loans on Total Assets (TL/TA), crisis (a dummy with value 1 from 2008 and after), a constant and add the product of dummy variables per year and country. In all the models we cluster standard errors at firm levels. In brackets are reported standard deviations and stars corresponds to the following p-value's levels: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$



**Table 11 Effect of Tone-from-the-Top, Accountability, Communication and Incentives' indicators on Return on Equity**

	ROE			
	(1)	(2)	(3)	(4)
TFTcy	0.067 [0.017]***			
ACCcy		0.075 [0.017]***		
COMcy			0.071 [0.016]***	
INCcy				0.078 [0.020]***
lnTA	0.028 [0.025]	0.028 [0.025]	0.027 [0.025]	0.030 [0.025]
TL/TA	-0.070 [0.121]	-0.074 [0.123]	-0.054 [0.122]	-0.076 [0.122]
crisis	-0.116 [0.054]**	-0.118 [0.052]**	-0.112 [0.033]***	-0.105 [0.059]*
cons	-0.321 [0.416]	-0.324 [0.416]	-0.313 [0.414]	-0.371 [0.417]
Firm FE	Yes	Yes	Yes	Yes
Time*State FE	Yes	Yes	Yes	Yes
<i>N</i>	884	884	884	884
<i>R</i> <sup>2</sup>	0.51	0.52	0.52	0.52
<i>R</i> <sub>adj</sub> <sup>2</sup>	0.41	0.41	0.41	0.41

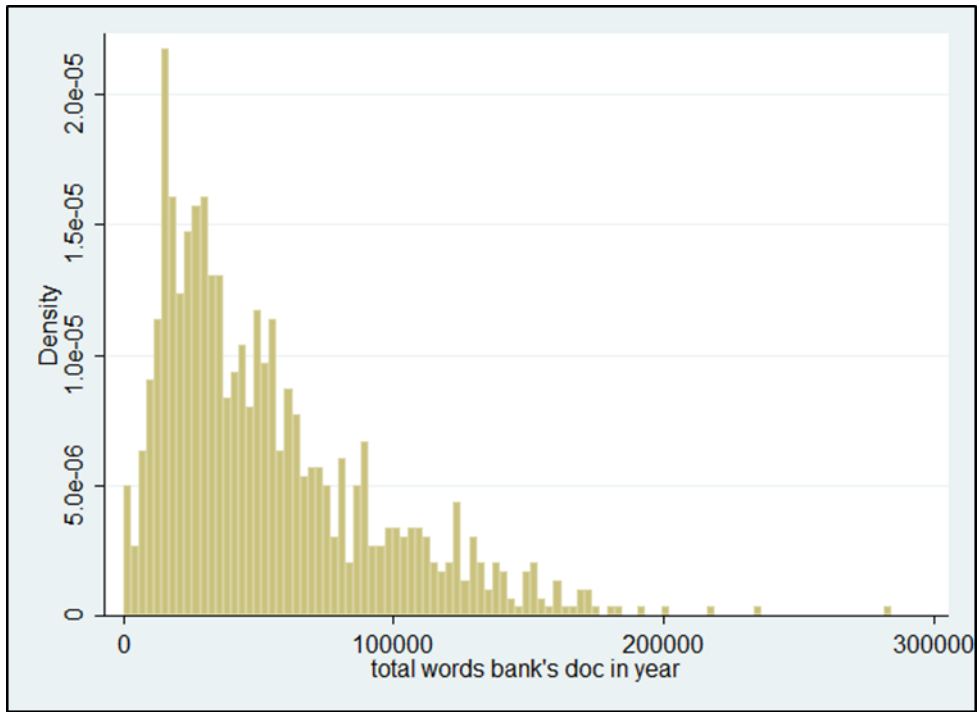
Regressions (1), (2), (3) and (4) estimate the effect of, respectively,  $TFT_{it}^{yc} = \frac{TFT_{it} - \overline{TFT}_{jt}}{sdTFT_{jt}}$ ,  $ACC_{it}^{yc} = \frac{ACC_{it} - \overline{ACC}_{jt}}{sdACC_{jt}}$ ,  $COM_{it}^{yc} = \frac{COM_{it} - \overline{COM}_{jt}}{sdCOM_{jt}}$  and  $INC_{it}^{yc} = \frac{INC_{it} - \overline{INC}_{jt}}{sdINC_{jt}}$  on the ratio between RWA and total loans controlling for the natural logarithm of total assets (lnTA), Gross loans on Total Assets (TL/TA), crisis (a dummy with value 1 from 2008 and after), a constant and add the product of dummy variables per year and country. In all the models we cluster standard errors at firm levels. In brackets are reported standard deviations and stars corresponds to the following p-value's levels: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Table 12 Effect of Tone-from-the-Top, Accountability, Communication and Incentives' indicators on Profit Before Tax on Risk Weighted Assets**

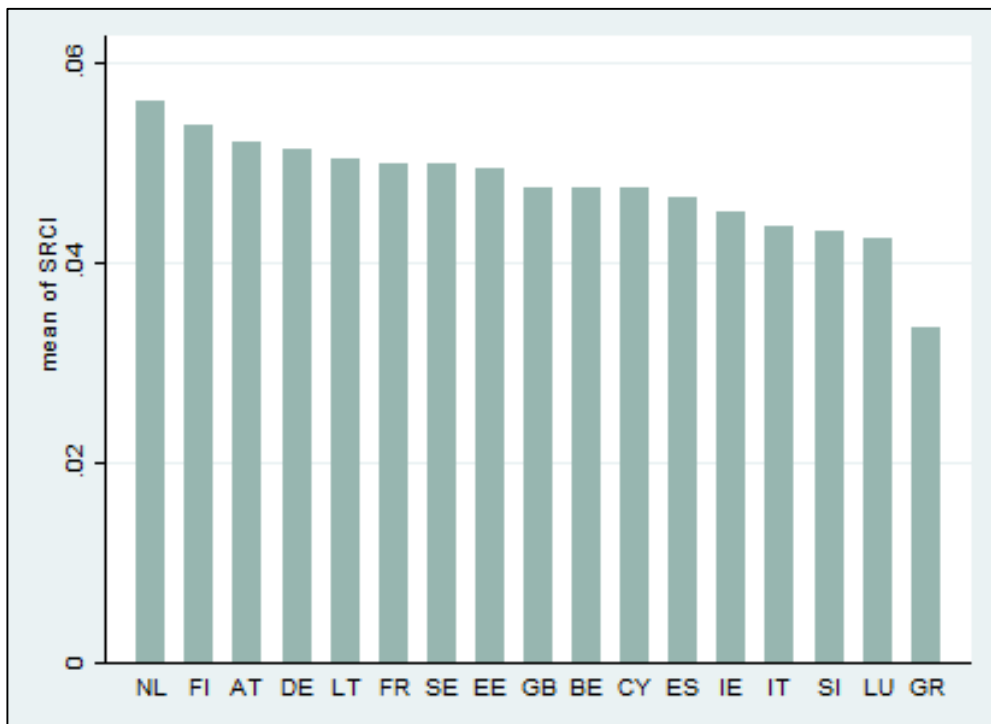
	GI/RWA			
	(1)	(2)	(3)	(4)
TFTcy	0.005 [0.002]**			
ACCcy		0.005 [0.002]**		
COMcy			0.008 [0.002]***	
INCcy				0.006 [0.004]
lnTA	0.007 [0.008]	0.007 [0.008]	0.007 [0.008]	0.007 [0.007]
TL/TA	-0.025 [0.021]	-0.024 [0.021]	-0.023 [0.021]	-0.024 [0.021]
crisis	-0.005 [0.004]	-0.005 [0.003]	-0.004 [0.003]	-0.004 [0.004]
cons	-0.094 [0.145]	-0.096 [0.144]	-0.106 [0.144]	-0.103 [0.142]
Firm FE	Yes	Yes	Yes	Yes
Time*State FE	Yes	Yes	Yes	Yes
<i>N</i>	720	720	720	720
<i>R</i> <sup>2</sup>	0.67	0.66	0.67	0.67
<i>R</i> <sub>adj</sub> <sup>2</sup>	0.58	0.58	0.58	0.58

Regressions (1), (2), (3) and (4) estimate the effect of, respectively,  $TFT_{it}^{yc} = \frac{TFT_{it} - \overline{TFT}_{jt}}{sdTFT_{jt}}$ ,  $ACC_{it}^{yc} = \frac{ACC_{it} - \overline{ACC}_{jt}}{sdACC_{jt}}$ ,  $COM_{it}^{yc} = \frac{COM_{it} - \overline{COM}_{jt}}{sdCOM_{jt}}$  and  $INC_{it}^{yc} = \frac{INC_{it} - \overline{INC}_{jt}}{sdINC_{jt}}$  on the ratio between profit before tax and RWA controlling for the natural logarithm of total assets (lnTA), Gross loans on Total Assets (TL/TA), crisis (a dummy with value 1 from 2008 and after), a constant and add the product of dummy variables per year and country. In all the models we cluster standard errors at firm levels. In brackets are reported standard deviations and stars corresponds to the following p-value's levels: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Figure 1 Total words per document's Distribution**



**Figure 2 Factor Means by Country**



## APPENDIX I

The following table shows the extracted terms from FSB’s framework. Words in bold in the column “Indicators” are the one extracted to be included in the QTA. In the column “Extracted GMUs”, each coma-separated-term in the first group is searched with each term of the second group.

**Table I.3 Extracted Group Meaning Units**

FSB’s ID	Indicators	Extracted GMUs <sup>1,2</sup>		
<b>4.1</b>	<b>Tone From the Top</b>			
4.1.a	<b>Leading by example</b>	board <sup>3</sup> ; management <sup>3</sup> ; sm <sup>3</sup> ; tm <sup>3</sup> ; ceo <sup>3</sup> ; cfo <sup>3</sup> ; cio <sup>3</sup> ; chro <sup>3</sup> ; cbo <sup>3</sup> ; cto <sup>3</sup> ; chair* <sup>3</sup>	A N D	lead; example
4.1.1	The <b>board</b> and senior <b>management</b> have a clear view of the <b>risk culture</b> to which they aspire for the financial institution and of the behavioral and organizational consequences of this culture, systematically monitor and assess the prevailing <b>risk culture</b> and proactively address any identified areas of <b>weakness</b> <sup>5</sup> or concern.	board; management; sm <sup>3</sup> ; tm <sup>3</sup> ; ceo <sup>3</sup> ; cfo <sup>3</sup> ; cio <sup>3</sup> ; chro <sup>3</sup> ; cbo <sup>3</sup> ; cto <sup>3</sup> ; chair* <sup>3</sup>	A N D	risk <sup>4</sup>
		risk AND culture; RC		
4.1.2	The <b>board</b> and senior <b>management</b> , consistently within their specific roles and responsibilities, promote through behaviours, actions and words, a <b>risk culture</b> that expects <b>integrity</b> and a sound approach to <b>risk management</b> as well as promotes an open <b>exchange</b> <sup>6</sup> of views, challenge and <b>debate</b> <sup>6</sup> .	board; management; sm <sup>3</sup> ; tm <sup>3</sup> ; ceo <sup>3</sup> ; cfo <sup>3</sup> ; cio <sup>3</sup> ; chro <sup>3</sup> ; cbo <sup>3</sup> ; cto <sup>3</sup> ; chair* <sup>3</sup>	A N D	risk <sup>4</sup>
		integrity		
4.1.3	The board and senior management promote healthy <b>scepticism</b> that encourages and supports openness to challenge by providing alternate <b>points of view</b> that may result in a better decision, ensuring that all directors have the tools, resources and information to carry out their roles effectively, particularly their <b>challenge</b> <sup>6</sup> function.	risk	A N D	scepticism; skepticism <sup>2</sup> ; sceptic <sup>2</sup> ; view
4.1.4	The board and senior management are committed to establishing, monitoring, and adhering to an effective <b>risk appetite framework</b> , supported by appropriate <b>risk appetite statement(s)</b> that underpin the financial institution’s risk management strategy, and is integrated with the overall business <b>strategy</b> .	risk	A N D	appetite; statement; strategy; framework; report <sup>3</sup>
4.1.5	Mechanisms are in place, such as talent development, succession planning, and confidential 470 degree review processes, to ensure that decision-making is not dominated by any one individual or small group of individuals in a manner that is detrimental to the interests of the institution as a whole.			
4.1.6	Senior management is subject to the same expectations for integrity, risk governance, and risk culture as all other employees that is, mechanisms are in place to subject them to incentive structures, which may include impacts on compensation, role and responsibilities, or termination.			
4.1.b	<b>Assessing espoused values</b>			
4.1.7	The <b>board</b> and senior <b>management</b> systematically assess whether the espoused <b>values</b> are communicated and proactively	tone-from-the-top; tone AND top <sup>7</sup> ; tone-at-the-		

	promoted by management and staff at all levels so that the ‘ <b>tone</b> at the <b>middle</b> ’ and throughout the institution is consistent with the ‘ <b>tone</b> at the <b>top</b> ’.	middle; tone AND middle		
		board; management; sm <sup>3</sup> ; tm <sup>3</sup> ; ceo <sup>3</sup> ; cfo <sup>3</sup> ; cio <sup>3</sup> ; chro <sup>3</sup> ; cbo <sup>3</sup> ; cto <sup>3</sup> ; chair* <sup>3</sup>	A N D	value
4.1.8	The board and senior management assess whether the institution’s risk <b>appetite</b> framework and business <b>strategy</b> are clearly understood and embraced by management and relevant staff, and effectively embedded in the decision-making and operations of the business.	risk	A N D	appetite; strategy; framework; report <sup>3</sup> ; statement <sup>3</sup>
4.1.c	Ensuring common <b>understanding</b> and <b>awareness</b> of <b>risk</b>	risk	A N D	understanding; understand <sup>2</sup> ; aware <sup>2</sup> ; awareness
4.1.9	Appropriate mechanisms are in place to ensure the risk appetite, risk management strategy, and business strategy are effectively aligned and embedded in decision making and operations at all appropriate levels of the institution.			
4.1.10	The <b>board</b> and <b>senior management</b> have clear views on the business <b>lines</b> considered to pose the greatest challenges in the management of risk, such as business lines with unexpected or unexplained results or business lines with non-financial risks that may not necessarily lend themselves to immediate and easy quantification, and these are subject to constructive and credible challenge about the risk-return balance.	board; management; sm <sup>3</sup> ; tm <sup>3</sup> ; ceo <sup>3</sup> ; cfo <sup>3</sup> ; cio <sup>3</sup> ; chro <sup>3</sup> ; cbo <sup>3</sup> ; cto <sup>3</sup> ; chair* <sup>3</sup>	A N D	line; employee <sup>3</sup> ; staff <sup>3</sup> ; department <sup>3</sup> ; office <sup>3</sup> ;
4.1.11	The board and senior management systematically monitor how promptly and effectively issues raised by the board, supervisors, and all control functions are addressed by management.			
4.1d	Learning from <b>past experiences</b>	past	A N D	experience
4.1.12	Processes are in place so that deficiencies in risk management, either in respect of its design, setup or implementation, are reviewed at the appropriate levels of the institution, with a view to identifying the <b>root</b> causes leading to the <b>deficiencies</b> and taking the opportunity to strengthen the financial institution’s <b>risk</b> culture.	risk	A N D	deficiencies; deficit <sup>2</sup> root; weakness <sup>3</sup>
4.1.13	Assessment and communication of lessons learnt from <b>past events</b> , both <b>failures</b> and successes, are seen as an opportunity to enhance the institution’s risk culture, and to enact real changes for the future.	past	A N D	failure; event
<b>4.2</b>	<b>Indicators of accountability</b>			
4.2.a	<b>Ownership of risk</b>	risk	A N D	ownership; account
4.2.1	Clear expectations are set with respect to the <b>monitoring</b> and <b>reporting</b> of, and response to, <b>current</b> and <b>emerging risk information</b> across the institution, including from business lines and risk management to the board and senior management.	risk	A N D	emerge; monitor; information; assessment <sup>3</sup> ; asses <sup>3</sup> ; view <sup>3</sup> ; communication <sup>3</sup> ; debate <sup>3</sup> ; exchange <sup>3</sup> ; manage <sup>3</sup> ; challenge <sup>3</sup>
4.2.2	Mechanisms are in place for the sharing of information on emerging, as well as low <b>probability</b> , high <b>impact risks</b> , both <b>horizontally</b> across business lines and <b>vertically</b> up the <b>institution</b> .	risk	A N D	probability; impact; horizontal; vertical; mechanism
4.2.3	The chief executive officer, senior management and employees throughout the institution, are held accountable for their actions and understand the consequences if they are not aligned with the			

	institution's core values, risk appetite and risk culture, regardless of whether their actions or behaviours resulted in direct financial gain or loss to the financial institution.			
4.2.b	Escalation process			
4.2.4	Appropriate <b>escalation</b> processes are established to support <b>risk</b> management and clear consequences for non-compliance with escalation procedures are defined.	risk	A N D	escalation; escalate <sup>2</sup>
4.2.5	Systematic <b>assessments</b> are conducted on whether <b>employees</b> are aware of escalation processes and believe the environment is open to critical <b>challenge</b> .	employee; line <sup>3</sup> ; staff <sup>3</sup> ; department <sup>3</sup> ; office <sup>3</sup> ;	A N D	assessment; asses <sup>2</sup> ; challenge
4.2.6	Mechanisms are established for <b>employees</b> to <b>elevate</b> and <b>report</b> concerns when they feel discomfort about products or practices, even where they are not making a specific allegation of wrongdoing.	employee; line <sup>3</sup> ; staff <sup>3</sup> ; department <sup>3</sup> ; office <sup>3</sup> ;	A N D	elevate; report
4.2.7	Appropriate <b>whistleblowing</b> procedures are in place and are expected to be utilized by employees without any reprisal, to support effective compliance with the risk management framework the treatment of whistle blowers is clearly articulated and followed in practice.	whistleblowing; whistle-blowing; whistle		
4.2.c	Clear consequences			
4.2.8	<b>Consequences</b> are clearly established, articulated and applied for anyone engaged in, or supporting, <b>risk-taking</b> that is excessive relative to the financial institution's <b>risk</b> appetite statement, regardless of whether positive revenue or net income was generated.	risk	A N D	consequence
4.2.9	Breaches in internal policies, procedures and <b>risk limits</b> , as well as non-adherence to internal codes of conduct, are understood to have a potential impact on an individual's compensation and responsibilities, can affect career progression and, depending on severity, may result in termination.	risk	A N D	limit
<b>4.3</b>	<b>Effective communication and challenge</b>			
4.3.a	<b>Open to alternative views</b>	view	A N D	alternative; open
4.3.1	Alternate <b>views</b> or questions from individuals and groups are encouraged, valued and respected and occur in practice. A culture of <b>open communication</b> and collaboration is constantly promoted to ensure that each <b>employee's</b> view is valued and the institution works together to strengthen <b>risk-related</b> decision making.	communication; view	A N D	open; effective
		risk	A N D	employee; line <sup>3</sup> ; staff <sup>3</sup> ; department <sup>3</sup> ; office <sup>3</sup> ;
4.3.2	<b>Mechanisms</b> are in place so that alternate <b>views</b> can be expressed in practice, as well as regular assessments of the openness to robust <b>challenge</b> at all layers of governance and how it is embedded within the decision-making process.	view; communication <sup>3</sup>	A N D	mechanism; challenge
4.3.b	Stature of control functions			
4.3.3	Control functions (e.g. <b>risk management</b> , <b>internal audit</b> , <b>compliance</b> ) share the same <b>stature</b> as the business lines, actively <b>participate</b> in committees and are proactively involved in all relevant risk <b>decisions</b> and <b>activities</b> .	audit; ia <sup>3</sup> ; risk AND management; rm <sup>3</sup> ; compliance; function <sup>3</sup> AND control <sup>3</sup> ; supervisory <sup>3</sup> ; chief AND risk <sup>3</sup> ; cro <sup>3</sup>	A N D	stature; participate; participation <sup>2</sup> ; activities; active <sup>2</sup> ; decisions; decide <sup>2</sup>
4.3.4	<b>Control functions</b> operate <b>independently</b> , have appropriate direct access to the board and senior management and a process is in place for them to periodically report to the <b>board</b> .	function AND control; audit <sup>3</sup> ; ia <sup>3</sup> ; risk AND management <sup>3</sup> ; rm <sup>3</sup> ;	A N D	independent; independence; cooperation <sup>3</sup>

		compliance <sup>3</sup> ; supervisory <sup>3</sup> ; chief AND risk <sup>3</sup> ; cro <sup>3</sup>		board; management; sm <sup>3</sup> ; tm <sup>3</sup> ; ceo <sup>3</sup> ; cfo <sup>3</sup> ; cio <sup>3</sup> ; chro <sup>3</sup> ; cbo <sup>3</sup> ; cto <sup>3</sup> ; chair* <sup>3</sup> employee <sup>3</sup> ; line <sup>3</sup> ; staff <sup>3</sup> ; department <sup>3</sup> ; office <sup>3</sup>
4.3.5	<b>Control</b> functions, including their respective representatives, have sufficient <b>stature</b> not only to act as advisors, but to effectively exert control tasks with respect to the institution’s risk culture.	function AND control; audit <sup>3</sup> ; ia <sup>3</sup> ; risk AND management <sup>3</sup> ; rm <sup>3</sup> ; compliance <sup>3</sup> ; supervisory <sup>3</sup> ; chief AND risk <sup>3</sup> ; cro <sup>3</sup>	A N D	stature
<b>4.4</b>	<b>Incentives</b>			
4.4.a	Remuneration and performance			
4.4.1	The <b>compensation</b> structure supports the institution’s espoused core <b>values</b> and promotes sound <b>risk</b> -taking behaviour and is supported by a well-documented process.	risk; value	A N D	compensation; cooperate <sup>2</sup> ; remuneration <sup>3</sup>
4.4.2	<b>Remuneration</b> and <b>performance</b> metrics consistently support and drive the desired <b>risk</b> -taking behaviours, <b>risk</b> appetite and <b>risk</b> culture of the financial institution, and encourage employees to act in the interest of the greater good of the company, rather than for themselves or their business line.	community <sup>3</sup> ; society <sup>3</sup> ; risk <sup>4</sup>	A N D	remuneration; performance; result <sup>3</sup>
4.4.3	Annual <b>performance</b> reviews and <b>objectives</b> -setting processes are linked to promoting the institution’s desired core <b>values</b> and behaviours as well as <b>compliance</b> with policies and procedures, including addressing in a timely manner deficiencies highlighted by internal <b>audit</b> and <b>supervisory</b> findings.	audit; ia <sup>3</sup> ; supervisory; function AND control <sup>3</sup> ; risk AND management <sup>3</sup> ; rm <sup>3</sup> ; compliance <sup>3</sup> ; chief AND risk <sup>3</sup> ; cro <sup>3</sup>	A N D	performance; objective; deficiencies; deficiency <sup>2</sup>
4.4.4	<b>Incentive compensation</b> programs systematically include individual and group adherence to the financial institution’s core <b>values</b> and <b>risk</b> culture, including treatment of <b>customers</b> , <b>cooperation</b> <sup>7</sup> with internal control functions and supervisors, respect of risk limits, and alignment between <b>performance</b> and <b>risk</b> <sup>8</sup> .	risk; value; costumer	A N D	incentive; compensation; bonus <sup>3</sup>
		risk		performance; costumer
4.4.b	Succession planning			
4.4.5	<b>Succession</b> planning processes for key management positions include <b>risk</b> management experience and not only revenue-based accomplishments for instance, individuals with responsibilities consistent with the chief risk officer, chief <b>compliance</b> officer, and chief <b>audit</b> executive can be considered as potential candidates for executive positions, including the chief executive officer.	audit; ia <sup>3</sup> ; compliance; function AND control <sup>3</sup> ; risk AND management <sup>3</sup> ; rm <sup>3</sup> ; supervisory <sup>3</sup> ; chief AND risk <sup>3</sup> ; cro <sup>3</sup>	A N D	succession; carrier <sup>3</sup> ; development-plan, plan <sup>3</sup>
4.4.c	Talent development			
4.4.6	Understanding key <b>risks</b> , essential elements of risk management, and the institution’s <b>culture</b> is considered a critical <b>skill</b> set for senior employees and reflected in their development plans.	risk; culture	A N D	skill
4.4.7	<b>Job rotation</b> between <b>control</b> functions and business lines is considered a way to facilitate a virtuous cycle for bringing business knowledge to the control functions and introducing risk awareness to the decision-making process of the business line.	function AND control; audit <sup>3</sup> ; ia <sup>3</sup> ; risk AND management <sup>3</sup> ; rm <sup>3</sup> ; compliance <sup>3</sup> ; supervisory <sup>3</sup> ; chief AND risk <sup>3</sup> ; cro <sup>3</sup>	A N D	rotation
4.4.8	<b>Training</b> programs are available for all staff to develop <b>risk</b> management competencies and, more broadly, the elements supporting a sound risk culture, including effective challenge and open communication.	risk	A N D	train; course

**Notes**

1. The basic idea is that the use of certain terminology suggest that the bank has a sound risk culture. The words are chosen from the FSB’s framework, which proposes four minimum characteristics for a sound risk culture, and some indicators to measure them. The most of indicators reveal useful terms for our dictionary but other not, the framework is used to extract the terminology a bank with sound risk culture should use. Sure enough, our index is not an exact measure of the FSB’s framework but a proxy of it. Neither the contracted variable want to be a complete measure of the bank’s risk culture, it is just an index that provides an approximation, sufficient for our research purpose.
2. Since during the searching in the texts words are tokenized, sentences with words that are not verb and noun itself are integrated with substantive with the same significance.
3. The term is included because related with FSB’s sentence even if it is not present in the specific indicator.
4. The FSB’s framework refers to risk culture but the sentence consider just risk. This because a certain attitude to risk culture determine the same attitude to the risk itself (eg. A bank in which the board has a clear view of risk culture will have an attitude to look at risk, so we aspect it to use terms as view, monitor, report)
5. Included in 4.2.12
6. Included in 4.2.1
7. Included in 4.3.4
8. Included in 4.4.2

The following table identifies the synonymous chosen for the text analysis. The column “M” reports the number of the FSB’s attribute (A) the words refers to. The column “Collins” reports a reference number in square brackets to identify which extracted word synonymous refers to. In the same column one find “n” if synonymous are taken considering the extracted term as a noun, “v” if they taken considering it as a verb, numbers are the Collins-item’s id taken. Strikethrough words are not taken in the QTA.

**Table I.4 Synonymous**

A	Collins	Synonyms	Collins	Synonyms
1		board[1]; management[2]; sm ; tm; ceo; cfo; cio; chro; cbo; cto; chair; chairman[3]		lead[1]; example; risk[2]; employee[3]; line; staff[4]; department[5]; office[6]; value[7]
	[1]	n;3	[1]	v;1,2, 5,8 n;3 <del>go in front (of), head, be in front, be at the head (of), walk in front (of),</del> guide, conduct, steer, escort, precede, usher, pilot, show <del>the way,</del> command, rule, govern, preside <del>over,</del> head, control, <del>manage, direct,</del> supervise, <del>be in charge of,</del> head <del>up,</del> <del>cause,</del> prompt, persuade, move, draw, influence, motivate, prevail, induce, incline, dispose, example, direction, leadership, guidance, model, pattern
			[2]	n;1 danger, chance, threat, <del>possibility,</del> prospect, <del>speculation,</del> uncertainty, <del>hazard, likelihood, probability</del>
			[3]	n;1 worker, labourer, workman, staff <del>member, member of staff, hand, wage-</del> <del>earner, white collar worker, blue collar worker, hired hand, job-holder,</del> <del>member of the workforce</del>
	[2]	n;2	[4]	n;1 workers, employees, personnel, workforce, team, organization,
			[5]	n;1;2 section, office, unit, station, division, branch, bureau, subdivision, area, line, <del>responsibility,</del> function, <del>province, sphere, realm, domain, speciality</del>
	[3]	n;1	[6]	n;1 <del>place of work,</del> workplace, base, workroom, <del>place of business</del>
			[7]	pn;1 principles, morals, ethics, mores, standards <del>of behaviour,</del> code <del>of</del> <del>behaviour, standards</del>
				scepticism[1]; skepticism; sceptic; points <del>of view;</del> appetite[2]; statement; strategy[3]; report; framework; understand[4]; understanding[5]; aware[6]; awareness; deficiency[7]; deficit[8]; root[9]; weakness[10]; weak[11]; culture
	[1]		like previous	[1]



			[2]	n;2	desire, <del>liking, longing</del> , demand, taste, <del>passion, stomach, hunger</del> , willingness, <del>relish, craving, yearning</del> , inclination, zeal, zest, propensity, <del>hankering, proclivity, appetence</del>
			[3]	n;1	policy, procedure, planning, programme, approach, scheme, manoeuvring <del>grand design</del>
			[4]	v;1	comprehend, <del>get, take in</del> , perceive, grasp, know, see, follow, realize, recognize, appreciate, be aware of, penetrate, <del>make out</del> , discern, <del>twig, fathom, savvy</del> , apprehend, conceive, suss, <del>get to the bottom of, get the hang of, tumble to, catch on to, cotton on to, make head, tail of, get your head round</del>
			[5]	n;1;4	perception, knowledge, grasp, sense, know-how, intelligence, judgment, awareness, appreciation, insight, skill, penetration, mastery, comprehension, familiarity <del>with</del> , discernment, proficiency, belief, view, opinion, impression, interpretation, feeling, idea, conclusion, notion, conviction, judgment, assumption, point of view, perception, suspicion, viewpoint, <del>hunch, way of thinking, estimation, supposition, sneaking suspicion, funny feeling</del>
			[6]	a; 1	informed, enlightened, knowledgeable, learned, expert, versed, <del>up to date, in the picture, plugged in, in the know, erudite, well-read, au fait, in the loop, well-briefed, clued up</del>
			[7]	n; 1;2	lack, <del>want</del> , deficit, absence, shortage, deprivation, inadequacy, scarcity, dearth, privation, insufficiency, scantiness, failing, fault, weakness, defect, flaw, drawback, shortcoming, imperfection, frailty, <del>demerit</del>
			[8]	n;1	shortfall, shortage, deficiency, loss, default, arrears
			[9]	n;1;2	<del>stem, tuber, rhizome</del> , radix, radicle, source, cause, heart, bottom, beginnings, base, seat, <del>occasion</del> , seed, foundation, origin, core, fundamental, essence, nucleus, starting point, germ, <del>crux, nub, derivation, fountainhead, mainspring</del>
			[10]	n;3;4; 5	<del>powerlessness</del> , vulnerability, impotence, meekness, irresolution, <del>spinelessness</del> , ineffectuality, timorousness, <del>cravenness, cowardliness</del> , inadequacy, deficiency, transparency, lameness, <del>hollowness, implausibility, flimsiness, unsoundness, tenuousness</del> , failing, fault, defect, deficiency, flaw, shortcoming, blemish, imperfection, achilles heel, <del>chink in your</del> armour, lack
			[11]	a;1;2	feeble, exhausted, frail, debilitated, spent, wasted, weakly, tender, delicate, faint, fragile, shaky, sickly, <del>languid, puny, decrepit</del> , unsteady, infirm, <del>anaemic</del> , effete, enervated, deficient, wanting, poor, lacking, inadequate, pathetic, faulty, substandard, under-strength
		past[1]			experience; event[1]; failure[2]
[1]	a;2	last, recent, previous, preceding	[1]	n;1	incident, happening, experience, matter, affair, occasion, proceeding, fact, business, circumstance, episode, adventure, milestone, occurrence, escapade
			[2]	n;1	lack of success, defeat, collapse, abortion, wreck, frustration, breakdown, overthrow, miscarriage, fiasco, downfall
					rc; tone-from-the-top; tone-at-the-middle; integrity[1]
			[1]	n;1	honesty, principle, honour, virtue, goodness, morality, purity, righteousness, probity, rectitude, truthfulness, trustworthiness, incorruptibility, <del>uprightness, scrupulousness</del> , reputability
		tone			top, middle
2		risk[1]			ownership; account[1]; emerge[2]; monitor[3]; information[4]; asses[5]; assessment; challenge[6]; view[7]; communication; debate[8]; exchange[9]; manage[10]; low probability; high impact; horizontal; vertical; mechanism[11]; escalation[12]; consequence[13]; limit[14]
	[1]	like previous	[1]	v;1	consider, rate, value, explain, judge, estimate, think, hold, believe, count, reckon, assess, weigh, calculate, esteem, deem, compute, gauge, appraise, regard as
			[2]	v;1;2	come <del>out</del> , appear, come <del>up</del> , surface, rise, proceed, arise, turn <del>up</del> , spring <del>up</del> , emanate, materialize, issue, become apparent, develop, come <del>out</del> , turn <del>up</del> , <del>become</del> known, <del>come to</del> light, <del>crop up</del> , transpire, materialize

			[3]	v;1	check, follow, record, watch, survey, observe, scan, oversee, supervise, keep an eye <del>on</del> , keep track <del>of</del> , keep tabs <del>on</del>
			[4]	n;1	facts, details, <del>material</del> , news, latest, <del>report</del> , <del>word</del> , message, notice, advice, <del>knowledge</del> , data, intelligence, instruction, counsel, <del>the score</del> , <del>gen</del> , <del>dope</del> , info, <del>inside story</del> , blurb, lowdown, tidings, drum, heads <del>up</del>
			[5]	v;1 n;1;2	judge, determine, estimate, <del>fix</del> , analyse, evaluate, rate, value, check <del>out</del> , compute, gauge, weigh <del>up</del> , appraise, size <del>up</del> , eye <del>up</del> , judgment, analysis, determination, evaluation, valuation, appraisal, estimation, <del>rating</del> , opinion, estimate, computation, evaluation, <del>rating</del> , <del>rate</del> , <del>charge</del> , <del>tax</del> , <del>demand</del> , <del>fee</del> , <del>duty</del> , <del>toll</del> , <del>levy</del> , <del>tariff</del> , <del>taxation</del> , valuation, <del>impost</del>
			[6]	v;4	question, interrogate, accost
			[7]	v;1;2	regard, see, consider, judge, perceive, treat, estimate, reckon, deem, look <del>on</del> , adjudge, think <del>about</del> , look <del>at</del> , see, inspect, gaze <del>at</del> , eye, watch, check, regard, survey, witness, clock, examine, observe, explore, stare <del>at</del> , scan, contemplate, check <del>out</del> , behold, eyeball, gawp <del>at</del> , recce, <del>get a load of</del> , spectate, <del>take a look at</del>
			[8]	v;1;2 n;1;2	discuss, question, talk <del>about</del> , argue <del>about</del> , dispute, examine, contest, deliberate, contend, wrangle, thrash <del>out</del> , controvert; consider, reflect, think <del>about</del> , weigh, consideration, reflection, meditation, deliberation, cogitation, contemplate, deliberate, ponder, revolve, mull <del>over</del> , ruminate, <del>give thought to</del> , cogitate, meditate <del>upon</del> , discussion, talk, argument, dispute, analysis, conversation, consideration, controversy, dialogue, contention, deliberation, polemic, altercation, disputation
			[9]	n;1	conversation, talk, word, discussion, chat, dialogue, <del>natter</del> , <del>powwow</del>
			[10]	v;1-6	<del>be in</del> charge <del>of</del> , run, handle, rule, direct, conduct, command, govern, administer, oversee, supervise, preside <del>over</del> , <del>be head of</del> , <del>call the shots in</del> , superintend, <del>call the tune in</del> , organize, <del>use</del> , handle, govern, regulate, cope, <del>survive</del> , <del>shift</del> , <del>succeed</del> , <del>get on</del> , carry <del>on</del> , <del>fare</del> , <del>get through</del> , make <del>out</del> , cut it, <del>get along</del> , make do, perform, do, deal <del>with</del> , achieve, carry <del>out</del> , undertake, cope <del>with</del> , accomplish, contrive, finish <del>off</del> , bring <del>about</del> <del>or off</del> , control, influence, guide, handle, master, dominate, manipulate, steer, operate, <del>pilot</del>
			[11]	n;2	process, workings, way, <del>means</del> , system, <del>performance</del> , operation, <del>medium</del> , <del>agency</del> , method, <del>functioning</del> , technique, procedure, <del>execution</del> , methodology
			[12]	n;1	<del>increase</del> , rise, <del>build up</del> , <del>expansion</del> , <del>heightening</del> , <del>developing</del> , <del>acceleration</del> , <del>upsurge</del> , <del>intensification</del> , <del>amplification</del>
			[13]	n;1	result, effect, outcome, repercussion, <del>end</del> , issue, event, sequel, <del>end result</del> , <del>upshot</del>
			[14]	n;1;2 v;1	boundary, end, edge, border, extent, pale, confines, frontier, precinct, perimeter, periphery, limitation, maximum, restriction, ceiling, restraint, restrict, control, check, fix, bound, confine, specify, curb, restrain, ration, hinder, circumscribe, hem <del>in</del> , demarcate, delimit, <del>put a brake on</del> , <del>keep within limits</del> , straiten
		employee[1]; line[2]; staff[3]; department[4]; office[5]			assessment; asses[1]; challenge[2]; elevate[3]; report[4]
[1-5]	like previous	[1-2]	n;1;2	like previous	
		[3]	v;1	promote, raise, advance, upgrade, exalt, <del>kick upstairs</del> , <del>aggrandize</del> , <del>give advancement to</del>	
			[4]	v;2;3 n;2;8	communicate, publish, record, announce, tell, state, air, detail, describe, note, cover, document, give <del>an account of</del> , relate, broadcast, post, tweet, pass <del>on</del> , proclaim, circulate, relay, recite, narrate, write <del>up</del> , inform <del>on</del> , <del>shop</del> , betray, denounce, incriminate, tell <del>on</del> , blow <del>the</del> whistle <del>on</del> , grass <del>on</del> , rat <del>on</del> , inculpate, <del>dob in</del> , account, record, detail, note, statement, relation, version, communication, tale, description, declaration, narrative, summary, recital, paper, review

whistleblowing; whistle-blowing; whistle					
		view[1]			alternative[1]; mechanism[2]; open[3]; effective; challenge[4]
[1]	n;2;3	scene, picture, sight, prospect, aspect, perspective, landscape, outlook, spectacle, panorama, vista, vision, sight, visibility, perspective, eyeshot, range	[1]	a;1;3	different, other, substitute, alternate, substitute, other, different, replacement, alternate, comple <sup>TM</sup> mentary, non-standard
			[2]	n;2	like previous
			[3]	n;4	frank, direct, natural, plain, innocent, straightforward, sincere, transparent, honest, candid, truthful, upfront, plain-spoken, above-board, unreserved, artless, ingenuous, guileless, straight from the shoulder, open
			[4]		like previous
		communication			open[1]; effective; mechanism[3]; challenge[4]
[1]	n;2		[1-4]		like previous
		employee[1]; line[2]; staff[3]; department[4]; office[5]			risk[1]
[1-5]		like previous		[1]	like previous
		audit; ia; rm; compliance; supervisory; cro			board[1]; management[2]; sm; tm; ceo; cfo; cio; chro; cbo; cto; chair[3]; chairman; employee[4]; line[5]; staff[6]; department[7]; office[8]; stature[9]; participate[10]; participation[11]; active[12]; activity[13]; decide[14]; decision[14]; independent[16]; independence; cooperation[17]; cooperate[18]
			[1-8]		like previous
			[9]	n;2	importance, standing, prestige, size, rank, consequence, prominence, eminence, high station
			[10]	v;1	take part, be involved, engage, perform, join, enter, partake, have a hand, get in on the act, be a party to, be a participant, come to the party
			[11]	n;1	taking-part, contribution, partnership, involvement, assistance, sharing in, joining-in, partaking
			[12]	a;1	busy, involved, occupied, engaged, tiring, lively, energetic, bustling, restless, on the move, strenuous, tireless, on the go
			[13]	n;	action, work, life, labour, movement, energy, exercise, spirit, enterprise, motion, bustle, animation, vigour, hustle, exertion, hurly burly, liveliness, activeness,
			[14]	v;1	make a decision, make up your mind, reach or come to a decision, end, choose, determine, purpose, elect, conclude, commit yourself, come to a conclusion, conclude
			[15]	n;1	judgment, finding, ruling, order, result, sentence, settlement, resolution, conclusion, outcome, verdict, decree, arbitration
			[16]	a;1;5	separate, unrelated, unconnected, unattached, uncontrolled, unconstrained, neutral, objective, detached, impartial, just, fair, equal, open-minded, equitable, disinterested, unbiased, even-handed, nonpartisan, unprejudiced, non-discriminating
			[17]	n;1;2	teamwork, concert, unity, collaboration, give-and-take, combined effort, esprit de corps, concurrence, help, assistance, participation, responsiveness, helpfulness
			[18]	v;1;2	work together, collaborate, coordinate, join forces, conspire, concur, pull together, pool resources, combine your efforts, help, contribute to, assist, go along with, aid, pitch in, abet, play ball, lend a helping hand

3

		risk AND chief, management			board[1]; management[2]; sm; tm; ceo; cfo; cio; chro; cbo; cto; chair; chairman[3]; employee[4]; line[5]; staff[6]; department[7]; office[8]; stature[9]; participate[10]; participation[11]; active[12]; activity[13]; decide[14]; decision[14]; independent[16]; independence; cooperation[17]; cooperate[18]
			[1-18]		like previous
		function AND control			board[1]; management[2]; sm; tm; ceo; cfo; cio; chro; cbo; cto; chair; chairman[3]; employee[4]; line[5]; staff[6]; department[7]; office[8]; stature[9]; participate[10]; participation[11]; active[12]; activity[13]; decide[14]; decision[14]; independent[16]; independence; cooperation[17]; cooperate[18]
			[1-18]		like previous
4		community; society			remuneration[1]; performance; result[2];
			[1]	n;1	payment, income, earnings, salary, pay, return, profit, fee, wages, reward, compensation, repayment, reparation, indemnity, retainer, reimbursement, recompense, stipend, emolument
			[2]	n;1	consequence, effect, outcome, <del>end</del> , result, issue, event, development, product, reaction, fruit, sequel, upshot
		audit; ia; rm; compliance; supervisory; cro			succession; career; development-plan; plan; rotation; performance; objective[1]; deficiencies; deficiency[2]
			[1]	n;1	purpose, aim, goal, end, plan, hope, idea, design, target, wish, scheme, desire, object, intention, ambition, aspiration
			[2]		like previous
		risk AND chief, management			succession; career; development-plan; plan; rotation; <del>performance</del> ; objective[1]; deficiencies; deficiency[2]
			[1-2]		like previous
		function AND control			succession; career; development-plan; plan; rotation; performance; objective[1]; deficiencies; deficiency[2]
			[1-2]		like previous
		risk[1]			train[1]; course[2]; succession; career; development plan; skill[3]; remuneration[4]; compensation[5]; incentive[6]; bonus; performance; result[7]; customer[8]
	[1]	like previous	[1]	v;1;2	instruct, school, prepare, improve, coach, teach, <del>guide</del> , discipline, rear, educate, drill, tutor, rehearse, study, learn, qualify, <del>be taught</del> , prepare, <del>take instruction</del>
			[2]	n;4	classes, <del>course of study</del> , programme, schedule, lectures, curriculum, studies
			[3]	n;1	expertise, ability, proficiency, experience, art, technique, facility, talent, intelligence, craft, competence, readiness, accomplishment, knack, <del>ingenuity, finesse, aptitude, dexterity, cleverness, quickness, adroitness, expertness, handiness, skilfulness</del>
			[4]		like previous
			[5]	n;1	reparation, <del>damages</del> , payment, recompense, indemnification, <del>offset</del> , remuneration, indemnity, restitution, reimbursement, <del>need, requital</del>
			[6]	n;1	inducement, motive, encouragement, urge, <del>come on, spur, lure, bait</del> , motivation, carrot, impulse, stimulus, impetus, stimulant, goad, incitement, enticement
			[7]		like previous
			[8]	n;1	client, consumer, <del>regular, buyer, patron, shopper, purchaser, habitué</del>
		value[1]			remuneration[1]; compensation[2]; incentive[3]; bonus
[1]	like previous	[1-3]		like previous	
	culture			skill[1]	

			[1]		like previous
		customer[1]			remuneration[1]; compensation[2]; incentive[3]; bonus
[1]		like previous	[1-3]		like previous

The following table show all GMUs considered in the QTA. To make the table more compact we aggregated in the same line GMUs with similar terms inside the vector, each Group 1's term is searched with each term of Group 2 and 3. First column report attribute's number.

**Table I.5 All GMUs considered in the analysis**

A	Group 1	Group 2
1	board, management, sm, tm, ceo, cfo, cio, chro, cbo, cto, chair, head, leader, director, executive, committe, boss, governor, panel, administr, control, president, chief, chairperson	lead, exampl, risk, employe, line, staff, depart, offic, valu, guid, conduct, steer, escort, preced, usher, pilot, command, rule, govern, presid, head, control, persuad, move, draw, influenc, motiv, prevail, induc, inclin, dispos, direct, leadership, guidanc, model, pattern, danger, chanc, threat, prospect, uncertainti, hazard, worker, labour, workman, jobhold, workforc, personnel, team, organ, section, unit, station, divis, branch, bureau, subdivis, area, function, place, workplac, base, workroom, principl, moral, ethic, more, standard
	risk, danger, chance, threat, prospect, uncertaint, hazard	sceptic, skeptic, appetit, statement, strateg, report, framework, understand, awar, defici, deficit, root, weak, doubt, suspicion, disbelief, cynic, incredul, desir, demand, tast, passion, willing, yearn, inclin, propens, polici, plan, programm, approach, scheme, manoeuvring, comprehend, grasp, know, realiz, recogn, appreci, aware, penetr, make, discern, apprehend, conceiv, suss, tumble, catch, cotton, head, tail, percept, knowledg, sens, knowhow, insight, skill, masteri, comprehens, familiar, profici, belief, impress, interpret, feel, idea, conclus, notion, convict, assumpt, supposit, enlighten, learn, expert, vers, pictur, pluggedin, erudit, wellread, wellbrief, lack, want, absenc, shortag, depriv, inadequaci, scarciti, dearth, privat, insuffici, scanti, fail, fault, defect, flaw, drawback, shortcom, imperfect, frailti, shortfal, loss, default, arrear, radix, radicl, sourc, caus, heart, bottom, begin, base, seat, seed, foundat, origin, core, fundament, essenc, nucleus, start, deriv, fountainhead, mainspr, vulner, impot, meek, irresolut, spineless, ineffectu, timor, craven, cowardli, transpar, lame, hollow, implaus, flimsi, unsound, tenuous, blemish, achilles, armour, feebl, exhaust, frail, debilit, spent, wast, tender, delic, faint, fragil, shaki, sick, languid, puni, decrepiti, unsteady, infirm, anaem, effet, enerv, poor, inadequ, pathet, faulti, substandard, understrength, culture
	past, last, recent, previous, precedent	experienc, event, failur, incid, happen, matter, affair, occas, proceed, fact, busi, circumst, episod, adventur, mileston, occur, escapad, lack, defeat, collaps, abort, wreck, frustrat, breakdown, overthrow, miscarriag, fiasco, downfall
	rc, tonefromthetop, toneatthemiddle, tone at the middle, integrity, honesty, principle, honour, virtue, goodness, morality, purity, righteousness, probity, rectitude, truthfulness, trustworthiness, incorruptibility, reputability	
	tone	top, middle
2	risk, danger, chance, threat, prospect, uncertaint, hazard	ownership, account, emerg, monitor, inform, ass, challeng, view, communic, debat, exchang, manag, prob, impact, horizont, vertic, mechan, escal, consequ, limit, consid, rate, valu, explain, judg, estim, think, hold, believ, count, reckon, weigh, calcul, esteem, deem, comput, gaug, apprais, appear, come, came, surfac, rise, proceed, aris, turn, spring, eman, materi, issu, appar, develop, known, light, transpir, check, follow, record, watch, survey, observ, scan, overse, supervis, keep, fact, detail, news, latest, notic, advic, data, intellig, instruct, counsel, info, determin, analys, evalu, check, weigh, size, judgment, analysi, valuat, opinion, question, interrog, accost, regard, see, perceiv, treat, adjudg, look, inspect, gaze, eye, clock, examin, explor, stare, contempl, behold, eyebal, gawp, recc, spectat, discuss, argue, disput, contest, deliber, contend, wrangl, thrash, controvert, reflect, consider, medit, cogit, ponder, revolv, mull, rumin, talk, argument, convers, controversi, dialogu, content, polem, alterc,

	word, chat, run, handl, rule, direct, conduct, command, govern, administ, preside, superintend, organ, regul, cope, carry, cut, perform, do, deal, achiev, carry, undertak, accomplish, contriv, finish, control, influenc, guid, master, domin, manipul, steer, work, way, result, effect, outcom, repercuss, event, sequel, boundari, end, edg, border, extent, pale, confin, frontier, precinct, perimet, peripheri, maximum, restrict, ceil, restraint, fix, bound, specifi, curb, restrain, ration, hinder, circumscrib, hem, demarc, delimit, straiten
employe, line, staff, depart, offic, worker, labour, workman, jobhold, workforc, personnel, team, organ, section, unit, station, divis, branch, bureau, subdivis, area, function, place, workplac, base, workroom	ass, challeng, elev, report, judg, determin, estim, analys, evalu, rate, valu, check, comput, gaug, weigh, weighs, apprais, size, eye, judgment, analysi, valuat, opinion, question, interrog, accost, promot, rais, advanc, upgrad, exalt, communic, publish, record, announc, state, air, detail, describ, note, cover, document, give, broadcast, post, tweet, pass, proclaim, circul, relay, recit, narrat, write, inform, betray, denounc, incrimin, tell, grasses, rat, grass, inculp, dob, account, statement, relat, version, tale, descript, declar, summari, paper, review
whistleblowing, whistleblowing, whistle	
view, scene, pictur, sight, prospect, aspect, perspect, landscap, outlook, spectacl, panorama, vista, vision, visibl, eyeshot, rang	altern, mechan, open, effect, challeng, differ, other, substitut, replac, complementari, nonstandard, process, work, way, system, oper, method, techniqu, procedur, methodolog, frank, direct, natur, plain, innoc, straightforward, sincer, transpar, honest, candid, truth, upfront, plainspoken, unreserv, artless, ingenu, guileless, question, interrog, accost
communication	open, effect, mechan, challeng, process, work, way, system, oper, method, techniqu, procedur, methodolog, frank, direct, natur, plain, innoc, straightforward, sincer, transpar, honest, candid, truth, upfront, plainspoken, unreserv, artless, ingenu, guileless, question, interrog, accost
employe, line, staff, depart, offic, worker, labour, workman, jobhold, workforc, personnel, team, organ, section, unit, station, divis, branch, bureau, subdivis, area, function, place, workplac, base, workroom	risk, danger, chance, threat, prospect, uncertaint, hazard
3 audit, ia, rm, compliance, supervisory, cro	board, management, sm, tm, ceo, cfo, cio, chro, cbo, cto, chair, employe, line, staff, depart, offic, statur, particip, activ, decid, decis, independ, cooper, head, leader, director, execut, committe, boss, governor, panel, administr, control, presid, chief, chairperson, import, stand, prestig, size, rank, consequ, promin, emin, part, involv, engag, perform, join, enter, partak, hand, parti, take, contribut, partnership, assist, share, busi, occupi, restless, move, strenuous, tireless, go, action, work, labour, movement, choos, determin, elect, conclud, conclus, judgment, find, rule, order, result, sentenc, settlement, resolut, outcom, verdict, decre, arbitr, separ, unrel, unconnect, unattach, uncontrol, unconstrain, neutral, object, detach, impart, fair, equal, openmind, open, equit, disinterest, unbias, evenhand, nonpartisan, unprejud, nondiscrimin, teamwork, concert, collabor, giveandtak, combined, concurr, help, togeth, coordin
risk AND chief, management	board, management, sm, tm, ceo, cfo, cio, chro, cbo, cto, chair, employe, line, staff, depart, offic, statur, particip, activ, decid, decis, independ, cooper, head, leader, director, execut, committe, boss, governor, panel, administr, control, presid, chief, chairperson, import, stand, prestig, size, rank, consequ, promin, emin, part, involv, engag, perform, join, enter, partak, hand, parti, take, contribut, partnership, assist, share, busi, occupi, restless, move, strenuous, tireless, go, action, work, labour, movement, choos, determin, elect, conclud, conclus, judgment, find, rule, order, result, sentenc, settlement, resolut, outcom, verdict, decre, arbitr, separ, unrel, unconnect, unattach, uncontrol, unconstrain, neutral, object, detach, impart, fair, equal, openmind, open, equit, disinterest, unbias, evenhand, nonpartisan, unprejud, nondiscrimin, teamwork, concert, collabor, giveandtak, combined, concurr, help, togeth, coordin

	function AND control	board, management, sm, tm, ceo, cfo, cio, chro, cbo, cto, chair, employe, line, staff, depart, offic, statur, particip, activ, decid, decis, independ, cooper, head, leader, director, execut, committe, boss, governor, panel, administr, control, presid, chief, chairperson, import, stand, prestig, size, rank, consequ, promin, emin, part, involv, engag, perform, join, enter, partak, hand, parti, take, contribut, partnership, assist, share, busi, occupi, restless, move, strenuous, tireless, go, action, work, labour, movement, choos, determin, elect, conclud, conclus, judgment, find, rule, order, result, sentenc, settlement, resolut, outcom, verdict, decre, arbitr, separ, unrel, unconnect, unattach, uncontrol, unconstrain, neutral, object, detach, impart, fair, equal, openmind, open, equit, disinterest, unbiass, evenhand, nonpartisan, unprejud, nondiscrimin, teamwork, concert, collabor, giveandtak, combined, concurr, help, togeth, coordin
4	good, community, society	remuner, payment, income, earn, salari, pay, return, profit, fee, wage, reward, compens, repay, repar, indemn, retain, reimburs, recompens, stipend, emolu, consequ, effect, outcom, result, issu, event, develop, product, reaction, fruit, sequel, upshot
	audit, ia, rm, compliance, supervisory, cro	success, career, developmentplan, rotat, defici, purpos, aim, goal, plan, hope, idea, design, target, wish, scheme, desir, intent, ambit, aspir, lack, want, deficit, absenc, shortag, depriv, inadequaci, scarciti, dearth, privat, insuffici, scanti, fail, fault, weak, defect, flaw, drawback, shortcom, imperfect, frailty
	risk AND chief, management	success, career, developmentplan, rotat, defici, purpos, aim, goal, plan, hope, idea, design, target, wish, scheme, desir, intent, ambit, aspir, lack, want, deficit, absenc, shortag, depriv, inadequaci, scarciti, dearth, privat, insuffici, scanti, fail, fault, weak, defect, flaw, drawback, shortcom, imperfect, frailty
	function AND control	success, career, developmentplan, rotat, defici, purpos, aim, goal, plan, hope, idea, design, target, wish, scheme, desir, intent, ambit, aspir, lack, want, deficit, absenc, shortag, depriv, inadequaci, scarciti, dearth, privat, insuffici, scanti, fail, fault, weak, defect, flaw, drawback, shortcom, imperfect, frailty
	risk, danger, chance, threat, prospect, uncertaint, hazard	train, cours, success, career, plan, remuner, compens, incent, bonus, school, prepar, improv, coach, teach, disciplin, rear, educ, drill, tutor, rehears, studi, qualifi, taught, class, course, schedul, lectur, curriculum, expertis, abil, experi, art, techniqu, facil, talent, craft, compet, readi, knack, skil, payment, incom, earn, salari, pay, return, profit, fee, wage, reward, repay, repar, indemn, retain, reimburs, recompens, stipend, emolu, indemnif, restitut, induc, motiv, encourag, urg, comeon, spur, bait, carrot, impuls, stimulus, impetus, stimul, goad, incit, entic, product, reaction, fruit, upshot, customer, client, consumer
	value, principle, moral, ethic, mores, behaviour	remuner, compens, incent, bonus, payment, incom, earn, salari, pay, return, profit, fee, wage, reward, repay, repar, indemn, retain, reimburs, recompens, stipend, emolu, indemnif, restitut, induc, motiv, encourag, urg, comeon, carrot, impuls, stimulus, impetus
	culture	skill, expertis, abil, profici, experi, art, techniqu, facil, talent, intellig, craft, compet, readi, accomplish, knack
	customer, client, consumer	remuner, compens, incent, bonus, payment, incom, earn, salari, pay, return, profit, fee, wage, reward, repay, repar, indemn, retain, reimburs, recompens, stipend, emolu, indemnif, restitut, induc, motiv, encourag, urg, comeon, carrot, impuls, stimulus, impetus