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A New International Database on Financial Fragility

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A New International Database on Financial Fragility*

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Abstract

We present a new database on financial fragility for 124 countries over 1998 to 2012. In addition to commercial banks, our database incorporates investment banks and real estate and mortgage banks, which are thought to have played a central role in the recent financial crisis. Furthermore, it also includes cooperative banks, savings banks and Islamic banks, that are often thought to have different risk appetites than do commercial banks. As a result, the total value of financial assets in our database is around 50% higher than that accounted for by commercial banks alone. We provide eight different measures of financial fragility, each focussing on a different aspect of vulnerability in the financial system. Alternative selection rules for our variables distinguish between institutions with different levels of reporting frequency.

1 Introduction

In both research and policy making, there is a pressing need for a comprehensive international database that identifies the characteristics of financial systems that are vulnerable to crises. The analysis of such a database would enhance our understanding of the principal mechanisms through which crises are initiated and propagated. Existing financial sector datasets (e.g. Beck et al., 2000; Cihak et al., 2013) focus on the commercial banking sector,

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but recent financial crises have highlighted the pivotal role played by investment banks and real estate and mortgage banks. In our database, investment banks and real estate and mortgage banks each account for 9% and 5% respectively of total bank assets, while cooperative banks and savings banks together account for another 20%. Moreover, we provide a greater range of measures of financial fragility than do the existing datasets. Our database uses bank-level data from the Bureau van Dijk's *Bankscope* in order to construct the country-level financial fragility variables.[1] It incorporates all deposit-taking institutions and also investment banks, since the activities of investment banks are not always separate from those of commercial banks in all countries, and investment banking activities are known to have played a major role in the most recent financial crisis.

The paper is organised as follows: section 2 presents the data preliminaries, section 3 discusses the selection rules, section 4 provides the aggregation methodology, section 5 analyses the newly constructed data, and section 6 concludes.

2 The Bank-Level Data

2.1 Data definitions and summary statistics

Bankscope covers 18 different types of financial institution.[2] Our country-level data are constructed using information about six of these types, accounting for 23,287 out of the 29,366 institutions listed. There are five types of deposit-taking institution - commercial banks, co-operative banks, Islamic banks, real estate and mortgage banks,[3] and savings banks - plus investment banks. The annual data span 1998-2012 inclusive. Table 1 shows the number of banks of each type and the proportion of assets accounted for by each type. It can be seen that commercial banks account for around two thirds of banking assets in the database; we show in section 5.5 that neglecting other types of banks can lead to mis-measurement of the overall level of financial fragility in the economy. Moreover, taking on board additional bank types can allow for a more in-depth analysis of the sources of financial fragility,

[1]The bank-level data downloaded is version 275.1 and available along with the newly constructed macro data at http://www2.le.ac.uk/departments/economics/research/esrc-dfid-project.

[2]These types are pre-defined in *Bankscope*. However, it is important to note that the activities of an individual bank may span several categories. For example, in some counties a commercial bank may also be involved in investment banking activities.

[3]In the UK these are known as building societies.

including examining the role played by different types of banks.[4] For example, we show in section 5.5 that in the Netherlands and Germany, where cooperative and savings banks account for a substantial proportion of banking assets, the overall level of financial fragility is lower when these types of banks are included.[5]

Table 2 shows data based on the eight pre-defined activity levels in

Table 1: Frequency and asset shares of different banking institutions

Specialisation	**Frequency**	**Percent**	**Asset Share**
Commercial Banks	15,574	66.88	66.68
Cooperative Banks	3,507	15.06	10.80
Investment Banks	1,012	4.35	8.61
Islamic Banks	67	0.29	0.10
Real Estate and Mortgage Banks	399	1.71	4.98
Savings Banks	2,728	11.71	8.83
Total	**23,287**	**100**	**100**

Bankscope. Banks are grouped into two broad categories: 'active' and 'inactive'. Active banks include both those continuing to report to *Bankscope* and those known to be active but no longer reporting; some active banks are in receivership. A bank is classed as inactive if it has become bankrupt or has been liquidated, dissolved, or dissolved and merged. However, some banks have become inactive for no specified reason. Each year, different banks become active or cease to be active, so the panel of active banks is unbalanced. In any given year, approximately two thirds of the banks in the dataset are active and operating, and therefore in a position to report financial data.

One challenge in interpreting the data is deciding how to treat banks which are coded as active but report little or no accounting information. We do not know whether these banks are in financial distress, or whether there has been a change in the nature of their activity. It is possible that such banks ceased to report in an attempt to hide their financial problems. This implies a potential bias in the data for which there is no straightforward remedy. More broadly, banks are under no compulsion to report to *Bankscope*, so those which do report may not constitute a representative sample. For this reason we will present alternative country-level measures based on different rules for selecting individual banks into our sample, which are discussed below. We recommend that researchers employing our data use a range of alternative measures in order to check the robustness of their results.

[4]The Appendix offers a detailed note on Islamic banking prevalence in the database.

[5]These findings conform to what we would expect as these bank types are generally more risk-averse than commercial banks, Beck et al. (2009).

Table 2: Bank status

Status and Code	Bank Frequency	Bank Percent
1: Active	15,312	65.76
2: Active (receivership)	487	2.09
3: Active (left Bankscope)	685	2.94
4: Bankrupt	38	0.16
5: Dissolved	1,041	4.47
6: Dissolved and merged	5,386	23.13
7: Liquidation	254	1.09
8: No reason provided for inactivity	84	0.36
Total	**23,287**	**100**

Table 3 provides a list of all 36 financial indicators available in *Bankscope*, along with their summary statistics.[6] The variables highlighted in bold are used to construct the country-level data. The motivation for selecting these variables is provided later in this section; detailed definitions of the variables appear in Table 4 and in the Appendix. All of the ratios in Table 3 are calculated using standard *Bankscope* definitions.

Table 3 shows that even the most frequently reported variable (the return on annual average assets, ROAA) has only 127,365 observations across all institutions and years. This is far less than the theoretical maximum of 349,305, highlighting the unbalanced nature of the panel. Other variables have far fewer observations: for example, there are only 27,473 observations of net charge-offs divided by average gross loans. Overall, however, most of the variables have over 100,000 observations, and there are only seven with fewer than 50,000.

The seven bank-level variables of financial fragility (that are used to construct the country-level data) are as follows: equity divided by total assets, impaired loans divided by total gross loans, the cost to income ratio, returns on average assets, net loans divided by total assets, liquid assets divided by total assets, and net charge-offs[7] divided by average gross loans.

[6] We considered trimming/winsorising the bank-level data to remove possible outliers but decided against that following assurances from *Bankscope* that the data is triple-checked before it appears online. Specifically, the procedure for uploading and checking the data is as follows (i) banks update directly to Fitch using some form of automatic procedure (e.g. Oracle or some database) and the data entries are checked by Fitch (ii) *Bankscope* gets the data from Fitch and checks it (iii) *Bankscope* uploads and checks the data again to verify it has been uploaded correctly.

[7] Net charge-offs are generally used to measure risk exposure, but also may measure asset quality. Banks charge off bad debt (i.e. remove it from their loan portfolios) when all other methods to reclaim the loan have failed, so charge-offs may be a lagging indicator

Table 3: Summary statistics of the financial variables downloaded

Variable	**Observations**	**Mean**	**Standard Deviation**	**Minimum**	**Maximum**
Total Assets ($ US millions)	120,285	10,400	84,400	0	3,070,000
Deposits and Short Term Funding ($ US millions)	119,225	6,845	54,200	0	2,570,000
Equity ($ US millions)	120,247	593	4,407	-99,600	180,000
Net Income ($ US millions)	119,526	45	978	-50,100	261,000
Loans ($ US millions)	100,248	5,838	39,400	-185	1,840,000
Gross Loans ($ US millions)	100,234	5,966	40,300	0	1,880,000
Total Customer Deposits ($ US millions)	97,460	5,935	46,600	0	2,170,000
Deposits from Banks ($ US millions)	80,229	1,769	14,300	0	718,000
Total Liabilities and Equity ($ US millions)	102,275	12,200	91,400	-6	3,070,000
Profit Before Tax ($ US millions)	101,513	75	1,444	-44,600	371,000
Tax ($ US millions)	97,790	24	426	-14,300	110,000
Net Interest Revenue ($ US millions)	101,166	197	3,339	-3,005	975,000
Tier 1 Capital ($ US millions)	30,928	1,444	7,097	-64,300	486,000
Total Capital ($ US millions)	33,378	1,706	8,164	-6,678	227,000
Tier 1 Ratio (%)	31,085	17.33	31.19	-747.38	962.18
Total Capital Ratio (%)	42,168	21.78	46.33	-766.94	989.84
Impaired Loans divided by Gross Loans (%)	49,504	6.06	10.17	0.00	312.55
Loan Loss Reserves divided by Gross Loans (%)	64,007	4.65	10.00	0.00	833.33
Loan Loss Reserves divided by Impaired Loans (%)	46,375	130.98	162.11	0.00	998.88
Impaired Loans divided by Equity (%)	50,088	44.84	77.28	0.00	993.42
Net Charge Offs divided by Average Gross Loans (%)	27,473	0.93	7.61	-251.43	811.32
Equity divided by Total Assets (%)	102,194	11.65	19.63	-992.86	100.00
Equity divided by Liabilities (%)	101,575	19.00	53.77	-275.00	999.85
Capital Funds divided by Total Assets (%)	64,047	10.71	16.34	-898.88	100.00
Capital Funds divided by Net Loans (%)	62,180	27.21	66.56	-856.25	994.03
Capital Funds divided by Liabilities (%)	63,839	16.37	47.54	-107.14	992.31
Net Interest Margin (%)	126,899	3.90	10.76	-987.50	966.67
Return on Average Assets (%)	127,365	0.69	4.95	-540.48	185.57
Return on Average Equity (%)	127,265	6.80	27.51	-998.29	997.05
Cost to Income Ratio (%)	125,730	70.77	38.47	0.00	988.89
Net Loans divided by Total Assets (%)	126,061	57.92	20.66	0.00	100.00
Net Loans divided by Deposits and Short Term Funding (%)	124,514	80.60	58.22	-150.46	999.36
Net Loans divided by Total Deposits and Borrowing (%)	115,138	70.40	35.07	-135.52	957.58
Liquid Assets divided by Deposits and Short Term Funding (%)	125,794	31.30	58.02	-4.61	999.41
Liquid Assets divided by Total Deposits and Borrowing (%)	116,058	25.11	43.85	-3.77	997.63
Liquid Assets divided by Total Assets (%)	100,162	21.36	18.67	0.00	100.00

Table 4: Core measures related to financial fragility

CAMEL Measure	Variable	Bankscope Code	Definition of Variable	Proprtional/Inverse
Capitalisation	$\frac{\text{Equity}}{\text{Total Assets}}$	$\frac{2055}{2060}$	$\frac{\text{Equity}}{\text{Total Liabilities + Equity}}$	(–)
Asset Quality	$\frac{\text{Impaired Loans}}{\text{Gross Loans}}$	$\frac{2170}{2000+2070}$	$\frac{\text{Impiared Loans}}{\text{Loans + Loan Loss Reserves}}$	(+)
Managerial Efficiency	$\frac{\text{Cost}}{\text{Income}}$	$\frac{2090}{2080+2085}$	$\frac{\text{Overhead Costs}}{\text{Net Interest Revenue + Other Operating Income}}$	(+)
Earnings	$\frac{\text{Net Income}}{\text{Average Total Assets}}$	$\frac{2115}{\text{Average } 2025}$	$\frac{\text{Net Income}}{\text{Total Assets}}$	(–)
Liquidity I	$\frac{\text{Net Loans}}{\text{Total Assets}}$	$\frac{2000}{2025}$	$\frac{\text{Loans}}{\text{Total Assets}}$	(+)
Liquidity II	$\frac{\text{Liquid Assets}}{\text{Total Assets}}$	$\frac{2075}{2025}$	$\frac{\text{Liquid Assets}}{\text{Total Assets}}$	(–)
Risk exposure	$\frac{\text{Net Charge Offs}}{\text{Average Gross Loans}}$	$\frac{2150}{2000+2070}$	$\frac{\text{Net Charge Offs}}{\text{Loans + Loan Loss Reserves}}$	(+)

Notes: The variables in the definition section in the final column (hence, the numbers in the third column) may be further disaggregated. The disaggregated values may be found in the Appendix so the reader may find what the composition of say "2000 (net loans)" truly is.

These variables were chosen to reflect the key areas of the CAMELS bank rating system (capitalisation, asset quality, managerial efficiency, earnings, liquidity, and sensitivity to risk[8]).

Using these seven bank-level variables we construct eight country-level measures of financial fragility: bank capitalisation, asset quality, managerial efficiency, the return on average assets, two alternative measures of liquidity, a measure of risk exposure, and a general financial stability measure (a Z-score)[9]. These measures are summarised in Table 4; more detail on the definition of the variables appears in the Appendix. The first five measures below are our "core" measures.

We measure ***bank capitalisation*** (102,194 observations) as the ratio of equity to total assets. The mean of this ratio is 11.7% and the median is 7.9%; at the 99th percentile the ratio is 82%. 33 banks have a ratio of 100%, and 275 banks with a negative ratio for at least one year.

Asset quality (49,504 observations) is measured as impaired loans divided by gross loans. The mean of this ratio is 6.1% and the median is 3.0%;

of fragility. Net charge-offs should be inversely related to the quality of loan screening and so positively related to the degree of fragility. In a case where a bank reclaims some of the bad loans at a later date, net charge offs will be negative, indicating a reduction in fragility.

[8]Although we do not compute a direct measure of sensitivity to risk, net charge-offs divided by average gross loans can be viewed as a proxy for sensitivity.

[9]The Z-score is the only country-level indicator that does not have a corresponding indicator at the bank-level, because its construction utilises the variability of returns across banks (see Section 4.2.).

the ratio exceeds 20% only at the 95th percentile. 438 institutions report a value of 0%, but the maximum value exceeds 100%: as Table 4 shows, the ratio includes loan loss reserves in the denominator, and when such reserves are negative the ratio may exceed 100%.

Managerial efficiency (125,730 observations) is measured as the cost-to-income ratio. A management which deploys its resources efficiently will look to maximise its income and reduce its operating costs, so a larger ratio implies a lower level of efficiency. The mean of this ratio is 71% and the median is 68%. The ratio does not exceed 100 until approximately the 95th percentile. There are 73 observations (from 39 banks) with a figure of zero. The ratio exceeds 100% for 3,318 banks and 6,450 bank-year observations. It exceeds 500% for 180 banks, and the largest value is 989%.

The ***return on average assets*** (127,365 observations) is used to measure an institution's earnings capacity. An institution has to make an appropriate return on assets to replenish or increase capital, fund expansion from retained earnings, or to generate profit that will be paid out as dividends. The mean return is 0.7% and the median is 0.5%. At the 10th percentile the value is 0%, and at the 90th percentile 2.2%. Only 36 banks have a value exceeding 50%; the maximum value is 186%. There are 5,345 banks (12,144 bank-year observations) with negative returns, and 72 banks (98 observations) with returns below -50%.

Our first measure of liquidity is ***net loans divided by total assets*** (126,061 observations), which is inversely related to liquidity. The mean of this variable is 57.9% and the median is 61.2%. 307 banks (1,026 bank-year observations) report a value of 0%, and two banks (five bank-year observations) report a value of 100%. At the 10th percentile the value is 29% and at the 90th percentile it is 81%.

Our second liquidity measure is ***liquid assets divided by total assets*** (100,162 observations). This variable has a mean of 21.4% and a median of 15.7%. The value at the 5th percentile is 2.5%, while the value at the 95th percentile is 62.1%. In 6 different banks in 6 different countries (Malaysia, the Netherlands, Russia, the United Kingdom, the United States and Uruguay) the ratio is 100%.

Our measure of risk exposure is ***net charge-offs as a fraction of total loans*** (27,473 observations). This variable has a mean of 0.9% and a median of 2.4%. The variable can be negative when banks recover debt that was originally written off, and this is a common occurrence in the data. At the 10th percentile the value is -0.08%, while at the 90th percentile its value is 2.4%. There are 16 cases (five banks in 12 countries) in which banks are charging off over 100% of their average loans.

A final indicator of financial fragility is the ***Z-score***. This variable is not taken directly from *Bankscope*, but is constructed at the country level using *Bankscope* data. The higher the Z-score, the more financially sound a country is. The construction of the Z-score is discussed in more detail below.

The construction of national aggregate data also makes use of the total annual average asset value of each bank, as a measure of the relative size of each institution.[10] The distribution of this variable is highly skewed: its mean value is USD 10.4 billion and its median is USD 454 million. The minimum is zero and the maximum is USD 3.1 trillion. At the 10th percentile the value is USD 45 million while at the 90th percentile the value is USD 8.9 billion.

2.2 The geographical distribution of banks

The database covers 124 countries. The number of institutions varies substantially across countries, and Table 5 notes the 25 countries with the largest and smallest number of banks in the database. Overall, there is a strong positive correlation between the number of banks and a country's level of economic development, and Africa accounts for only 796 out of the 23,287 banks in the database.[11] Some of the African countries are very small both in terms of GDP and in terms of population, and have a formal financial sector which is very rudimentary. Moreover, three of the African countries, South Africa, Nigeria and Kenya, account for over 25% of all banks from the continent. Many of the African banks report data for only a handful of years.

The infrequency of data from banks in developing countries (and particularly from African banks) creates potential problems in the construction of our dataset. In countries where bank penetration is low, country-level data may be driven by a very small number of banks. (Moreover, *Bankscope* does not include data from every bank in a country, and its selection may not be representative of the population of banks.) For this reason, the dataset of Beck et al. (2000) is based on a rule that in any one year excludes countries with fewer than three banks. However, the application of such a rule to our database would mean that four countries would be excluded entirely. This trade-off is discussed in more detail below.

[10]One alternative measure is the number of employees in a bank; however, few banks report this figure.

[11]The appendix provides a complete breakdown of the number of banks in each African country.

Table 5: Countries with the largest and smallest number of banks

Bank Rank	Country Name	Frequency	Bank Rank	Country Name	Frequency
1	United States of America	10,671	1	Guinea Bissau	1
2	Germany	2,605	2	Central African Republic	2
3	Russia	1,186	3	Djibouti	2
4	Japan	929	4	Equatorial Guinea	2
5	Italy	928	5	Eritrea	3
6	Switzerland	545	6	Sao Tome and Principe	3
7	France	512	7	Cape Verde	4
8	United Kingdom	377	8	Congo	4
9	Austria	369	9	Lesotho	4
10	Spain	269	10	Chad	5
11	Brazil	233	11	Guinea	5
12	Ukraine	191	12	Liberia	5
13	China	187	13	Seychelles	5
14	Norway	170	14	Swaziland	5
15	Denmark	149	15	Gabon	6
16	Argentina	134	16	Madagascar	6
17	Indonesia	132	17	Burundi	7
18	Sweden	130	18	Niger	7
19	Canada	124	19	Togo	7
20	Belgium	114	20	Namibia	8
21	India	106	21	Rwanda	8
22	Malaysia	105	22	Benin	9
23	Australia	102	23	Gambia	9
24	Hong Kong	102	24	Burkina Faso	10
25	Nigeria	96	25	Kyrgyzstan	10

3 Selection Rules Used in Constructing National Aggregates

A bank's entry into or exit from the database might be correlated with changes in its level of fragility, which introduces potential biases in a national aggregate measure based on all available data. In this case, restricting the sample to banks reporting consistently through time is likely to reduce the bias in the measurement of changes in national aggregates. However, the restriction is likely to result in a sample that is less representative in terms of aggregate levels. For this reason, the five core aggregate measures of financial fragility (bank capitalisation, asset quality, managerial efficiency, ROAA, and net loans divided by total assets) are constructed in five different ways, each way involving a different selection rule. We recommend that empirical applications using our data include a comparison of results for the five alternative measures, as a robustness check.

One potential selection rule would be to use the largest five or 10 banks (or largest 10% of banks) in a country, but then any systematic correlation between bank size and fragility would lead to biases in aggregate measures. Moreover, the large disparities in the number of banks per country mean that this rule is unlikely to produce consistent measures across countries.

Note also that there are substantial variations in individual bank size over the sample period, which introduces additional complications in the application of a rule based on bank size. Instead, we implement the following five alternative selection rules.

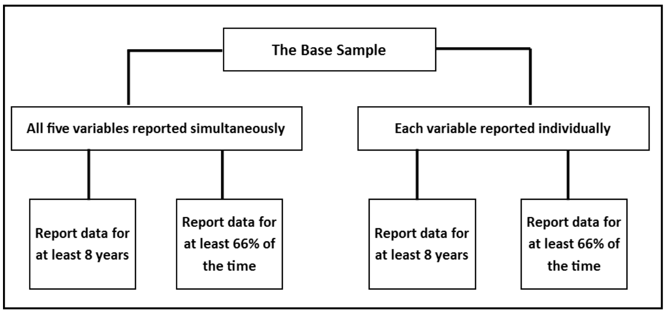
The first selection rule is to include all available observations for individual banks. If a bank reports the value of a particular variable in a given year then this value is used in the construction of the national aggregate, regardless of the frequency with which that bank reports data. This rule generates the "base sample" indicated in the uppermost part of the flow chart in Figure 1.

The next two selection rules are based on the frequency of reporting all five core variables.[12] One rule is based on the total number of years in which the five variables are reported: a bank is included when it reports all five variables simultaneously in at least eight years (not necessarily consecutive years). The other rule is based on the proportion of years for which the bank is known to exist, existence being indicated by the fact that the bank currently reports data, or that it has previously reported data and its name still appears in *Bankscope*. A bank is included when it reports all five variables simultaneously in at least 66% of the years for which it is known to exist. The 66% rule is less restrictive than the eight-year rule, as it entails the inclusion of banks that disappear early in the sample period.

The final two selection rules are variable-specific. For each of the five variables individually, the first of these rules includes a bank if it reports that variable in at least eight years. The other rule includes a bank if it reports that variable in at least 66% of the years for which it is known to exist.

Table 6 summarises all of the selection rules and Figure 1 illustrates their taxonomy. Letting *Var* stand for one of the five core variables, "*Var*" in Table 6 indicates a national aggregate constructed using the base sample rule, "*VarR*" indicates an aggregate based on the variable-specific eight-year rule, "*VarR5*" indicates an aggregate based on the eight-year rule applied to all five variables simultaneously, "*VarH*" indicates an aggregate based on the variable-specific 66% rule, and "*VarH5*" indicates an aggregate based on the 66% rule applied to all five variables simultaneously.

[12] The additional three variables (the Z-score, liquid assets divided by total assets and net charge-offs divided by gross loans) are constructed using the base sample selection rule only.



For each of the five variables, Table 7 indicates the total number of observations entailed by the five different selection rules. For four of the five variables, the base sample corresponds to over 100,000 observations. However, for impaired loans there are slightly fewer than 50,000 observations in the base sample, and consequently the selection rules which require all five variables to be reported simultaneously (*VarR5* and *VarH5*) entail fewer than 50,000 observations in all cases. By contrast, the variable-specific rules (*VarR* and *VarH*) entail relatively moderate reductions in the number of observations relative to the base sample. With the 66% variable-specific rule (*VarH*), the reduction represents less than 5% of the base sample (except in the case of impaired loans, for which the reduction is around 20%).

Table 6: Alternative selection rule criteria

Variable	**Is it required that all five variables reported simultaneously in a given year?**	**Is it required that a bank reports for at least eight years?**	**Is it required that a bank reports at least 66% of its time in the panel?**
Var	NO	NO	NO
VarR	NO	YES	NO
VarH	NO	NO	YES
VarR5	YES	YES	NO
VarH5	YES	NO	YES

Notes: Var stands for the variable name. The figures following "Var" and their definitions are available in the country code book in the Appendix.

4 Construction of the Aggregate National Data

4.1 Cross-country variation in bank prevalence

Before discussing the construction of national aggregates, it is informative to examine the variation in the prevalence of banks across countries, as sum-

Table 7: The total number of observations based on selection rules

Selection Rule	Equity	Impaired Loans	Cost To Income	Return On Assets	Net Loans
Var	102195	49504	125730	127365	126061
VarR5	32519	29519	32327	32498	32515
VarH5	42491	39578	42244	42423	42463
VarR	76256	29830	98331	99925	99168
VarH	98290	39953	121284	123301	121896

Notes: Var stands for the variable name. The figures following "Var" and their definitions are available in the country code book in the appendix.

marised in Table 8.[13] As noted above, there is a strong correlation between the number of banks and the overall level of economic development: in Africa, the number of banks that report data rarely exceeds 10. But also, the number of banks recorded in *Bankscope* increases over time. For example, Austria has only 180 banks before 2002, but this number increases to well over 200 in subsequent years. Until 2004 there are only 58 Chinese banks, but by 2010 there are over 150. This trend is much stronger in some countries than others. Moreover, in some countries there is a sharp increase in the number of banks recorded in a particular year, as for example in Italy in 2004. The reasons for this are unknown. These variations should be borne in mind when using the national aggregate data.

4.2 Aggregation from the bank to the country level

Aggregate national data are constructed as weighted averages, using weights based on individual banks' total asset values. Let X_{ijt} stand for measure X for bank i in country j in year t. Then the national aggregate is constructed as follows:

$$X_{jt} = \Sigma_{i \in j} W_{ijt} * X_{ijt} \tag{1}$$

Here, W_{ijt} is a weight constructed as follows:

$$W_{ijt} = \frac{A_{ijt}}{\Sigma_{i=1}^{i=N_{xjt}} A_{ijt}} \tag{2}$$

where A_{ijt} is the value of bank i's assets in country j in year t. Note that the number of banks (N_{xjt}) can vary across countries, across time, and also across variables. It also varies according to the selection rule used.

[13]The Appendix provides more detailed information about the appearance of individual banks in the database.

Our dataset also includes a Z-score measure. The Z-score is expected to be inversely related to financial fragility; it is constructed as follows:

$$Z_{jt} = \frac{\mathrm{ROAA}_{jt} + \dfrac{\mathrm{equity}_{jt}}{\mathrm{assets}_{jt}}}{\sigma_{\mathrm{ROAA}_j}} \tag{3}$$

Here, σ_{ROAA_j} is a country-specific standard deviation of the national average value of ROAA ($ROAA_{jt}$) over time.[14]

This approach is similar to that of Cihak and Hesse (2007) and differs from that of Cihak et al. (2013). Cihak et al. (2013) construct the standard deviation using five-year moving averages, which entails the loss of data for the first four years of the sample.

5 Summary Statistics

5.1 Summary statistics across all countries under different selection rules

Tables 9-13 present summary statistics for the national aggregate measure of the five core variables, with one table for each variable. Although stricter selection rules entail some reduction in sample size, with some country-year observations disappearing from the sample, the total number of observations is always well above 1,000 (out of a theoretical maximum of 1,860 from 124 countries over 15 years).

Table 14 shows the country level data for the three additional variables: liquid assets divided by total assets, net charge-offs divided by average gross loans, and the Z-score.

Tables 9-14 show a large degree of variability in the fragility measures as most standard deviations are large in comparison to their corresponding means. Note the substantial variation in national aggregate liquidity. Most of the country-year observations in the upper end of this distribution are in Africa, which is consistent with the finding of Demetriades and James (2011) that African banks are typically unable to extend credit to individuals and firms due to the dysfunctional nature of African credit markets.

Overall, the tables do not show a great deal of variation in summary

[14] In the computation of this standard deviation, the total number of years varies across countries: in some countries there are years with no data at all.

Table 8: Equity divided by total assets

Variable	Obs	Mean	Std. Dev.	Min	Max
Equity	1782	9.76	6.19	-41.58	85.37
EquityR5	1338	8.82	4.78	-52.04	26.86
EquityH5	1397	9.16	5.88	-45.27	97.52
EquityR	1669	9.79	6.74	-44.57	74.76
EquityH	1744	9.80	5.99	-42.47	85.37

Table 9: Impaired loans divided by gross loans

Variable	Obs	Mean	Std. Dev.	Min	Max
ImpLoans	1493	7.52	8.43	0.03	103.29
ImpLoansR5	1262	6.84	7.05	0.02	63.52
ImpLoansH5	1342	6.84	7.51	0.04	91.70
ImpLoansR	1281	6.98	7.22	0.02	63.52
ImpLoansH	1364	6.95	7.57	0.04	91.70

Table 10: The cost to income ratio

Variable	Obs	Mean	Std. Dev.	Min	Max
Costs	1764	60.72	21.47	3.81	382.17
CostsR5	1332	59.65	19.77	7.31	240.18
CostsH5	1391	60.26	18.91	11.32	267.35
CostsR	1630	60.25	22.01	1.94	374.52
CostsH	1716	60.69	21.45	6.80	382.17

Table 11: Returns on average assets

Variable	Obs	Mean	Std. Dev.	Min	Max
Returns	1779	1.34	2.57	-47.43	21.79
ReturnsR5	1334	1.30	2.87	-51.59	12.28
ReturnsH5	1391	1.26	2.67	-50.60	8.64
ReturnsR	1666	1.36	2.77	-50.22	12.47
ReturnH	1743	1.35	2.75	-48.16	45.92

Table 12: Net loans divided by total assets

Variable	Obs	Mean	Std. Dev.	Min	Max
NetLoans	1781	49.65	15.11	2.36	92.40
NetLoansR5	1338	52.49	14.29	0.50	96.52
NetLoansH5	1397	52.82	13.89	0.01	94.81
NetLoansR	1664	49.60	15.49	0.75	96.50
NetLoansH	1743	49.95	15.04	0.01	92.40

Table 13: Additional fragility measures

Variable	Obs	Mean	Std. Dev.	Min	Max
Liquid Assets	1781	28.38	15.54	0.49	96.39
Net Charge Offs	1212	1.07	2.64	-16.36	31.48
Z-Score	1779	14.97	11.13	-14.33	94.16

Table 14: Bank prevalence by country and by year

Country Name	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Albania	1	4	4	4	5	5	5	5	7	10	9	11	13	13	13
Algeria	5	7	8	10	10	12	15	14	15	15	16	16	15	15	15
Angola	2	3	3	5	6	8	8	9	11	11	12	14	15	15	15
Argentina	79	75	75	76	71	68	69	68	70	66	67	64	59	58	58
Australia	27	25	19	14	10	7	10	43	58	54	47	43	41	41	36
Austria	122	137	159	175	181	220	252	260	282	269	259	259	252	248	243
Azerbaijan	7	8	11	12	11	13	13	13	14	17	19	19	18	21	20
Bangladesh	11	14	15	15	15	15	17	17	18	18	19	24	34	38	38
Belarus	4	8	11	8	8	10	11	11	12	14	16	18	22	22	22
Belgium	54	52	50	51	54	51	47	49	49	48	48	43	41	40	37
Benin	4	4	4	5	6	6	5	6	7	7	6	4	3	3	3
Bolivia	9	8	8	8	8	8	8	8	7	7	8	8	11	11	11
Botswana	1	2	2	2	2	4	5	7	7	9	10	10	10	11	11
Brazil	112	120	127	137	134	132	132	132	135	137	131	128	126	124	123
Bulgaria	12	13	13	14	15	16	17	20	19	17	19	19	21	21	21
Burkina Faso	4	7	7	7	7	7	8	7	8	7	8	6	5	5	5
Burundi	5	5	5	6	6	6	6	6	4	4	4	4	2	2	2
Cameroon	6	7	7	7	9	9	9	11	11	11	12	11	11	11	11
Canada	31	27	27	29	24	30	32	34	34	33	30	26	56	70	69
Cape Verde	0	0	0	0	0	0	0	0	0	0	3	4	4	4	4
Central African Republic	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2
Chad	2	2	3	3	3	3	4	4	5	5	5	5	5	5	5
Chile	8	8	7	8	7	7	6	5	5	5	29	29	29	36	36

China	16	19	25	25	36	45	58	77	106	124	138	150	163	162	163
Colombia	32	22	21	20	18	19	18	16	14	18	23	23	26	28	34
Congo	0	0	1	1	1	1	1	1	1	3	4	4	4	4	4
Costa Rica	17	18	23	24	23	25	46	47	48	47	47	48	48	50	50
Cote d'Ivoire	9	11	11	11	12	14	16	16	17	18	18	17	17	17	17
Czech Republic	16	17	18	17	18	18	24	24	26	24	25	26	26	26	26
Democratic Rep. Congo	2	2	4	3	4	5	5	8	8	9	10	11	11	12	12
Denmark	62	69	71	68	66	65	79	90	94	92	113	111	110	105	92
Djibouti	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dominican Rep.	9	12	23	21	39	38	39	38	39	39	40	42	52	66	66
Ecuador	6	4	26	29	29	29	29	29	29	28	28	31	32	35	35
Egypt	31	32	32	32	33	33	32	30	25	26	26	26	27	28	28
El Salvador	10	10	11	11	11	11	11	11	12	13	12	12	14	14	16
Equatorial Guinea	0	0	0	0	0	1	1	1	1	1	2	2	2	2	2
Eritrea	1	1	2	2	2	2	2	3	3	3	3	3	3	3	3
Estonia	4	4	4	4	5	5	7	7	7	7	7	7	8	8	8
Ethiopia	5	5	6	6	6	7	7	7	7	8	8	10	11	11	11
Finland	6	6	4	1	1	3	6	12	13	14	15	15	15	15	15
France	225	236	233	218	203	186	206	252	255	247	248	234	251	244	239
Gabon	2	2	2	2	3	4	3	4	4	4	4	4	5	5	5
Gambia	1	3	3	3	3	4	5	5	7	7	7	8	9	9	9
Georgia	6	10	10	9	9	9	10	9	9	12	12	12	12	12	12
Germany	1975	2002	1905	1820	1734	1654	1635	1751	1727	1703	1654	1615	1597	1583	1555
Ghana	3	3	3	3	4	4	5	6	8	22	27	30	30	31	29
Greece	7	6	3	4	3	4	17	21	21	20	20	20	21	19	16
Guatemala	28	29	27	27	27	25	25	27	26	26	26	26	27	27	28
Guinea	0	1	2	2	2	2	2	2	2	3	3	3	3	3	3

Guinea Bissau	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
Hong Kong	26	27	26	24	23	23	45	58	60	62	63	64	65	65	65
Hungary	19	24	26	27	27	28	28	32	31	31	32	29	27	26	26
India	53	58	59	71	76	80	83	85	90	90	90	90	89	89	89
Indonesia	62	64	64	59	55	59	62	65	69	72	71	74	74	73	73
Ireland	21	20	18	17	13	10	19	31	36	34	31	31	22	21	21
Israel	17	18	18	19	16	14	12	12	12	12	12	12	12	12	11
Italy	139	144	126	122	76	42	35	637	647	655	643	632	630	612	573
Jamaica	1	1	2	2	10	11	13	14	14	14	14	14	14	16	16
Japan	778	786	762	762	729	706	689	682	679	680	678	676	683	683	678
Jordan	15	15	15	15	15	15	15	16	16	16	17	18	18	18	18
Kazakhstan	14	16	18	16	18	21	25	24	24	26	30	32	32	32	32
Kenya	29	29	31	31	32	32	36	33	33	38	38	39	39	40	40
Kyrgyzstan	0	0	5	5	6	6	6	7	7	8	8	8	7	7	7
Latvia	8	8	9	10	11	14	17	19	20	19	19	21	22	22	23
Lesotho	2	2	3	3	3	3	3	3	4	4	4	4	4	4	4
Liberia	0	0	0	0	0	0	0	0	2	3	4	4	4	4	4
Libya	2	5	5	6	7	7	8	8	8	8	7	7	6	7	7
Lithuania	6	8	8	7	7	8	8	9	10	10	10	12	12	12	11
Madagascar	2	4	5	5	5	5	5	5	5	6	6	6	6	6	6
Malawi	4	5	7	7	8	8	7	7	8	9	10	12	13	13	13
Malaysia	33	33	32	23	22	24	28	33	29	32	36	34	39	69	72
Mali	4	5	6	5	5	5	7	7	8	9	9	9	9	9	9
Mauritania	4	4	5	5	7	7	7	8	9	9	9	9	9	10	10
Mauritius	5	6	7	8	8	12	12	14	15	16	14	16	17	18	18
Mexico	27	27	30	30	30	30	33	33	43	52	53	53	53	55	62
Morocco	6	6	6	6	6	5	4	6	6	12	13	14	14	15	15

Mozambique	3	3	4	5	6	5	5	5	5	10	12	12	13	13	13
Namibia	1	2	3	3	2	1	2	6	6	6	6	6	6	6	6
Nepal	8	9	9	10	11	14	14	14	14	16	20	22	25	29	29
Netherlands	25	25	22	22	22	19	29	33	33	32	34	38	36	33	31
New Zealand	2	2	2	2	3	4	4	9	19	21	21	21	26	25	25
Nicaragua	8	8	6	6	7	5	5	4	5	5	6	6	6	7	7
Niger	1	2	3	3	4	4	5	5	6	6	6	6	6	6	6
Nigeria	46	53	56	60	59	56	58	45	15	16	16	18	25	29	28
Norway	11	12	16	17	19	33	50	100	119	122	128	136	138	140	138
Pakistan	15	21	20	23	23	28	30	40	39	38	39	41	42	41	42
Paraguay	20	19	19	17	15	12	12	12	12	15	16	16	18	17	17
Peru	19	15	16	15	15	14	17	16	16	16	18	18	20	20	20
Philippines	9	8	3	4	5	6	23	46	46	46	46	46	46	45	44
Poland	19	21	21	19	21	20	33	37	40	41	45	45	45	43	41
Portugal	16	16	14	13	13	13	16	34	36	38	41	39	41	40	39
Republic of Korea	10	9	12	11	11	20	20	24	22	23	23	32	49	49	49
Romania	14	16	18	18	19	20	23	24	24	25	26	28	30	30	29
Russia	25	52	80	111	138	159	507	706	903	948	911	966	935	912	904
Rwanda	2	2	2	3	3	4	4	4	4	5	6	8	8	8	8
Sao Tome and Principe	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Senegal	4	7	7	8	10	10	10	10	11	12	11	11	12	12	12
Seychelles	1	1	1	1	1	1	1	3	3	3	3	4	5	5	5
Sierra Leone	3	4	5	5	5	5	6	7	8	11	13	13	13	13	13
Singapore	21	18	18	16	13	14	20	28	29	32	32	29	28	28	27
South Africa	15	18	17	15	12	4	17	20	26	28	30	30	31	31	31
Spain	38	30	28	22	19	14	50	181	183	183	181	171	158	148	118
Sri Lanka	9	10	10	11	13	15	15	15	15	15	16	16	17	17	17

Sudan	7	8	13	14	15	15	15	19	20	21	23	24	24	24	24
Swaziland	2	3	3	3	4	5	5	5	5	5	5	5	5	5	5
Sweden	10	13	16	95	98	97	97	100	98	89	81	83	84	84	84
Switzerland	231	229	243	277	345	358	396	393	390	372	356	340	323	315	310
Taiwan	18	23	32	37	41	41	47	62	65	64	63	62	64	66	67
Thailand	14	17	20	28	29	29	30	32	32	36	36	35	37	36	36
Togo	2	2	2	3	3	3	3	4	6	6	6	6	6	6	6
Tunisia	7	7	8	9	10	16	17	17	19	19	20	20	21	21	21
Turkey	18	35	35	22	17	16	18	21	32	36	37	37	39	37	38
Uganda	8	9	10	12	11	11	11	11	12	13	16	17	17	17	17
Ukraine	4	9	10	15	17	21	22	25	27	27	27	27	28	28	181
United Kingdom	145	147	145	139	144	147	179	228	233	237	243	244	245	245	241
United Rep. of Tanzania	2	2	2	2	1	1	5	16	20	23	24	27	30	32	32
United States of America	756	2768	2767	2767	2762	2740	2657	2610	2533	2457	2390	2342	2272	2224	2169
Uruguay	17	20	26	43	39	35	35	35	35	35	35	35	36	33	33
Uzbekistan	2	5	6	6	6	9	10	10	10	11	14	17	18	21	20
Venezuela	20	62	64	64	57	57	59	59	59	59	58	58	54	53	52
Vietnam	7	9	10	10	14	15	17	19	30	32	38	48	52	51	48
Zambia	10	11	12	12	12	13	13	15	15	16	16	18	19	19	19
Zimbabwe	3	3	7	7	10	9	8	6	4	4	4	15	16	17	17

Notes: This table shows the maximum potential number of banks that may report data in a country for a given year.

statistics according to the selection rule used. This suggests that in some applications of our data the results may not be that sensitive to the choice of selection rule. However, the figures for some low-income countries with small numbers of banks may be more sensitive. The next sub-section provides some illustrative examples of the effect of the choice of selection rule on the distribution of the variables over time for selected countries.

5.2 Summary statistics for selected countries

The results in this sub-section pertain to eight different countries in different parts of the world and at different levels of financial and economic development: Argentina (with around 70 banks), Indonesia (with around 60 banks), Ukraine (with around 30 banks for most years[15]), Libya (with 8 banks), Nigeria (with around 50 banks at the beginning of the sample but only around 20 at the end[16]), South Africa (with around 20 banks), the Netherlands (with around 30 banks), and the United States (with around 1,000 banks).

Table 15 shows summary statistics for Argentina, which endured a financial crisis early on in the sample period. Since Argentina has a relatively large number of banks, all selection rules entail a full 15 observations for each variable. The choice of selection rule does not have a large impact on the sample mean. Note, however, that in the case of ROAA the less restrictive rules entail a negative mean and the more restrictive rules entail a positive mean. This is because the less restrictive rules lead to the inclusion of a relatively large number of bank-year observations from the crisis period. With the ROAA measure, therefore, stricter selection rules create an impression of less fragility. Nevertheless, this difference in mean values across selection rules is small relative to the standard deviations.

Table 16 shows that in Indonesia, which also has a relatively large number of banks and also endured a financial crisis early on in the sample period, the choice of selection rule also makes little difference to the mean values of the variables. The mean impaired loan ratio is slightly lower under stricter rules, again creating an impression of less fragility, but again this difference is small relative to the standard deviations.

In Libya (Table 17), there are very few banks. Even under the least restrictive rule, there are no observations for impaired loans, and for the other variables the choice of selection rule makes a large difference to the number

[15]However, there was a large increase in the number of Ukrainian banks in *Bankscope* in 2012.

[16]This is partly attributable to the vast amount of regulatory reforms throughout the sample period.

Table 15: Summary statistics for Argentina

Variable	Obs.	Mean	S. Dev.	Minimum	Maximum
Equity	15	10.41	1.44	7.17	13.32
EquityR5	15	10.46	1.21	8.46	12.83
EquityH5	15	11.33	1.33	8.88	13.90
EquityR	15	10.67	1.31	8.29	13.34
EquityH	15	10.39	1.47	7.09	13.33
ImpLoans	15	7.25	6.04	1.13	20.75
ImpLoansR5	15	6.77	5.45	1.09	18.00
ImpLoansH5	15	6.75	5.72	1.11	20.92
ImpLoansR	15	6.80	5.54	1.09	18.35
ImpLoansH	15	7.20	5.85	1.14	19.07
Costs	15	75.52	23.76	56.89	142.64
CostsR5	15	73.42	24.48	54.83	151.10
CostsH5	15	71.90	28.59	52.27	161.83
CostsR	15	75.53	25.06	56.18	147.54
CostsH	15	75.39	23.74	56.89	142.57
Returns	15	-0.06	4.15	-14.12	2.64
ReturnsR5	15	0.28	2.87	-8.59	2.69
ReturnsH5	15	0.30	3.35	-10.79	2.85
ReturnsR	15	0.23	3.02	-9.29	2.63
ReturnsH	15	-0.07	4.16	-14.16	2.64
NetLoans	15	43.39	7.55	30.82	56.24
NetLoansR5	15	44.46	8.18	31.18	59.33
NetLoansH5	15	44.38	6.82	32.47	57.46
NetLoansR	15	43.21	7.49	30.61	56.19
NetLoansH	15	43.54	7.62	30.82	56.30

Table 16: Summary statistics for Indonesia

Variable	Obs.	Mean	S. Dev.	Minimum	Maximum
Equity	15	5.05	13.57	-41.58	11.85
EquityR5	15	4.69	14.76	-46.18	11.94
EquityH5	15	4.76	14.52	-45.27	11.77
EquityR	15	4.90	14.37	-44.57	12.02
EquityH	15	5.01	13.81	-42.47	11.85
ImpLoans	15	10.08	11.95	2.12	47.84
ImpLoansR5	15	9.68	11.09	2.06	44.93
ImpLoansH5	15	9.63	10.95	2.11	44.05
ImpLoansR	15	9.68	11.09	2.06	44.93
ImpLoansH	15	9.78	11.23	2.13	45.29
Costs	15	58.71	9.88	49.30	78.65
CostsR5	15	55.45	10.57	33.79	78.78
CostsH5	15	54.41	10.25	31.84	78.59
CostsR	15	58.48	9.78	48.72	78.86
CostsH	15	55.75	11.27	34.04	78.61
Returns	15	-2.74	13.14	-47.43	2.46
ReturnsR5	15	-3.09	14.21	-51.59	2.51
ReturnsH5	15	-2.99	13.97	-50.60	2.46
ReturnsR	15	-2.98	13.86	-50.22	2.51
ReturnsH	15	-2.82	13.32	-48.16	2.46
NetLoans	15	43.36	14.72	19.90	63.09
NetLoansR5	15	43.00	15.08	18.70	63.11
NetLoansH5	15	43.24	14.99	18.97	62.97
NetLoansR	15	43.24	15.00	19.02	63.24
NetLoansH	15	43.33	14.80	19.62	63.09

Table 17: Summary statistics for Libya

Variable	Obs.	Mean	S. Dev.	Minimum	Maximum
Equity	15	10.95	6.49	5.28	27.01
EquityR5	0				
EquityH5	0				
EquityR	15	12.27	10.78	3.75	35.83
EquityH	15	11.59	7.11	5.28	27.01
ImpLoans	0				
ImpLoansR5	0				
ImpLoansH5	0				
ImpLoansR	0				
ImpLoansH	0				
Costs	15	49.16	26.07	18.49	95.12
CostsR5	0				
CostsH5	0				
CostsR	12	57.22	10.38	44.17	79.07
CostsH	15	48.52	31.06	15.37	110.10
Returns	15	0.48	0.39	-0.61	0.96
ReturnsR5	0				
ReturnsH5	0				
ReturnsR	15	0.44	0.39	-0.58	0.83
ReturnsH	15	0.52	0.40	-0.61	0.96
NetLoans	15	27.56	13.03	12.79	47.86
NetLoansR5	0				
NetLoansH5	0				
NetLoansR	12	32.78	11.94	14.29	49.78
NetLoansH	15	24.45	16.64	0.64	49.78

of observations. Under stricter rules there are no observations for any variable, and in a cross-country analysis Libya would drop out of the sample. However, there is little variation in the sample means across those selection rules that do allow a positive number of observations.

Although the Netherlands (Table 18) is a high-income country, banks do not report consistently to *Bankscope* across all years, and stricter selection rules do reduce the number of annual observations. Moreover, for some of the measures (in particular bank capitalisation) the variation in mean across selection rules is somewhat larger than in Argentina and Indonesia, both in absolute terms and relative to the corresponding standard deviations. Moreover, unlike in Argentina and Indonesia, there is some variation in the standard deviations across selection rules.

Table 19 shows that in Nigeria, which has a relatively large number of banks, the choice of selection rule makes only a small difference to the total number of annual observations. However, for all five variables, the choice of selection rule makes a very substantial difference to either the mean or the standard deviation (or both). This reflects a substantial variation in the number of banks reporting data in any one year. The total number of banks reporting declines from around 50 at the beginning of the sample[17] to around 20 at the end; moreover, the total number of banks reporting data in at least one year is 94, of which 66 cease to report at some point (see Tables V-VI in the Appendix). Whilst, regulatory reforms over the sample period may further explain the variation in bank numbers,[18] it may well be the case that the decision about whether to report data is influenced by a bank's financial health, in which case the inter-temporal variation in fragility is likely to be captured better by the stricter rules. Note that the strictest rule (*R5*) is associated with the largest inter-temporal standard deviations. Less restrictive rules may under-estimate inter-temporal changes because a nationwide worsening of fragility causes the most fragile banks to disappear from the sample.

Table 20 shows that the patterns in the South African data resemble those of the Netherlands much more closely than those of Nigeria. One pos-

[17] In 1998 the start date of the panel, due to reforms, 26 banking licenses were revoked in Nigeria leaving the total number of banks at 89. This already begins to question *Bankscope's* coverage, although 46 banks are reporting in this year,which is over 50%.

[18] In July 2004, a regulatory decree was passed that banks had to increase their minimal capital requirements. The intention was to increase bank size and create a more stable banking system. From the 89 banks in 1998, 14 failed to raise capital requirements or merge with another bank, and the number of banks fell to a total of 25. For further details see Hesse (2007). Our database shows that 31 banks exit the database in this year and *Bankscope's* coverage of 15 banks is 60%.

Table 18: Summary statistics for Netherlands

Variable	Obs.	Mean	S. Dev.	Minimum	Maximum
Equity	15	4.64	1.02	3.22	6.10
EquityR5	9	4.34	0.65	3.56	5.20
EquityH5	9	4.18	0.50	3.47	5.00
EquityR	15	6.35	2.59	3.64	10.94
EquityH	15	4.99	1.58	3.22	8.86
ImpLoans	9	2.00	0.56	1.18	2.74
ImpLoansR5	9	2.00	0.69	1.08	3.36
ImpLoansH5	9	2.01	0.57	1.19	2.76
ImpLoansR	9	2.00	0.69	1.08	3.36
ImpLoansH	9	2.00	0.56	1.18	2.73
Costs	15	62.32	6.22	51.21	72.94
CostsR5	9	65.14	2.42	61.14	69.00
CostsH5	9	65.37	2.05	62.79	69.42
CostsR	15	60.51	7.45	49.16	70.10
CostsH	15	59.45	8.12	46.10	68.78
Returns	15	0.40	0.38	-0.56	1.03
ReturnsR5	9	0.37	0.11	0.18	0.47
ReturnsH5	9	0.27	0.32	-0.53	0.49
ReturnsR	15	0.60	0.71	-1.03	2.30
ReturnsH	15	0.41	0.42	-0.57	1.20
NetLoans	15	60.82	6.40	49.99	70.80
NetLoansR5	9	60.15	4.97	52.69	66.19
NetLoansH5	9	61.74	4.93	54.35	67.82
NetLoansR	15	58.85	4.83	52.08	66.84
NetLoansH	15	57.59	3.50	49.91	63.03

Table 19: Summary statistics for Nigeria

Variable	Obs.	Mean	S. Dev.	Minimum	Maximum
Equity	15	11.63	5.42	-3.41	19.18
EquityR5	14	3.51	22.97	-52.04	22.12
EquityH5	15	11.74	5.59	-3.84	19.59
EquityR	14	5.63	18.07	-37.66	21.83
EquityH	15	11.72	5.38	-2.81	20.00
ImpLoans	15	15.55	7.68	4.04	32.10
ImpLoansR5	13	23.59	16.27	5.92	63.52
ImpLoansH5	15	14.84	7.53	3.58	31.16
ImpLoansR	13	23.59	16.27	5.92	63.52
ImpLoansH	15	14.84	7.53	3.58	31.16
Costs	15	69.83	14.34	56.68	101.94
CostsR5	13	78.74	39.52	49.99	164.49
CostsH5	15	69.62	15.37	56.33	107.72
CostsR	14	73.03	31.89	43.18	145.64
CostsH	15	69.42	14.58	55.83	105.38
Returns	15	1.47	3.91	-10.57	4.15
ReturnsR5	14	-0.61	12.26	-40.06	4.88
ReturnsH5	15	1.45	4.22	-11.32	4.27
ReturnsR	14	0.07	9.71	-31.27	4.82
ReturnsH	15	1.46	3.98	-10.66	4.09
NetLoans	15	35.79	3.32	31.10	41.49
NetLoansR5	14	31.79	7.29	15.82	44.43
NetLoansH5	15	36.00	3.51	31.39	42.36
NetLoansR	14	32.88	5.01	22.28	43.78
NetLoansH	15	35.83	3.49	31.25	41.96

Table 20: Summary statistics for South Africa

Variable	Obs.	Mean	S. Dev.	Minimum	Maximum
Equity	15	9.50	4.10	6.00	18.47
EquityR5	9	6.45	0.62	5.82	7.51
EquityH5	13	7.34	1.61	5.94	11.57
EquityR	9	6.65	0.69	5.98	7.85
EquityH	15	8.11	2.21	6.00	14.30
ImpLoans	14	5.24	4.82	1.71	20.84
ImpLoansR5	9	3.74	2.08	1.59	6.72
ImpLoansH5	13	3.42	1.92	0.73	6.69
ImpLoansR	9	3.74	2.08	1.59	6.72
ImpLoansH	13	3.42	1.92	0.73	6.69
Costs	15	59.86	13.92	46.49	102.05
CostsR5	9	56.31	4.70	49.84	64.24
CostsH5	13	53.51	8.10	34.31	63.93
CostsR	9	56.34	4.69	49.96	64.32
CostsH	15	60.21	13.68	47.84	102.05
Returns	15	1.33	0.46	0.34	2.13
ReturnsR5	9	1.17	0.22	0.88	1.45
ReturnsH5	13	1.44	0.51	0.92	2.91
ReturnsR	9	1.20	0.23	0.89	1.50
ReturnsH	15	1.27	0.41	0.34	1.86
NetLoans	15	64.62	7.97	44.63	75.35
NetLoansR5	9	67.61	2.13	64.85	70.59
NetLoansH5	13	67.31	3.27	59.69	72.45
NetLoansR	9	67.27	2.20	64.29	70.44
NetLoansH	15	64.15	8.72	44.63	75.34

Table 21: Summary statistics for the United States

Variable	Obs.	Mean	S. Dev.	Minimum	Maximum
Equity	15	7.64	0.72	6.84	9.12
EquityR5	15	8.62	0.84	7.34	9.86
EquityH5	15	8.89	0.86	7.57	10.15
EquityR	15	7.48	0.84	6.39	9.08
EquityH	15	7.65	0.73	6.84	9.12
ImpLoans	15	2.47	1.39	0.86	5.08
ImpLoansR5	15	2.57	1.37	0.96	4.86
ImpLoansH5	15	2.56	1.47	0.86	5.27
ImpLoansR	15	2.56	1.36	0.96	4.82
ImpLoansH	15	2.56	1.47	0.86	5.27
Costs	15	58.90	7.84	53.04	85.64
CostsR5	15	55.76	5.19	49.41	70.06
CostsH5	15	56.96	5.38	50.19	71.73
CostsR	15	58.42	8.11	52.56	86.01
CostsH	15	58.77	7.98	52.49	85.88
Returns	15	0.80	0.49	-0.54	1.20
ReturnsR5	15	0.84	0.48	-0.31	1.26
ReturnsH5	15	0.87	0.49	-0.33	1.30
ReturnsR	15	0.79	0.49	-0.54	1.19
ReturnsH	15	0.80	0.49	-0.54	1.20
NetLoans	15	50.99	1.98	45.89	53.38
NetLoansR5	15	56.32	2.12	51.61	59.26
NetLoansH5	15	55.98	2.14	50.61	58.82
NetLoansR	15	51.35	2.08	47.41	54.95
NetLoansH	15	51.11	1.93	45.90	53.43

Table 22: Summary statistics for Ukraine

Variable	Obs.	Mean	S. Dev.	Minimum	Maximum
Equity	15	12.23	2.16	10.00	17.33
EquityR5	15	10.19	2.23	3.88	14.15
EquityH5	15	10.82	2.69	3.88	14.88
EquityR	15	11.19	2.86	4.56	17.76
EquityH	15	11.76	3.00	4.56	17.76
ImpLoans	15	11.46	8.49	1.84	26.44
ImpLoansR5	15	9.94	7.08	2.03	23.00
ImpLoansH5	15	10.90	8.16	1.91	25.63
ImpLoansR	15	9.94	7.08	2.03	23.00
ImpLoansH	15	10.90	8.16	1.91	25.63
Costs	15	63.88	9.24	44.94	85.58
CostsR5	15	59.63	8.76	43.43	72.97
CostsH5	15	58.26	8.39	42.59	72.91
CostsR	15	65.65	13.37	44.64	107.19
CostsH	15	65.51	13.50	44.94	107.19
Returns	15	1.07	2.02	-3.94	6.22
ReturnsR5	15	0.74	1.60	-3.06	4.12
ReturnsH5	15	0.77	1.61	-3.29	4.12
ReturnsR	15	0.77	2.20	-4.03	6.06
ReturnsH	15	0.82	2.15	-3.94	6.06
NetLoans	15	64.95	12.17	39.41	82.52
NetLoansR5	15	66.95	11.53	43.72	83.23
NetLoansH5	15	66.48	11.31	43.72	83.39
NetLoansR	15	65.83	11.74	44.16	82.63
NetLoansH	15	65.35	11.53	44.16	82.52

sible explanation for this is that accounting standards in South Africa are much higher than those in Nigeria. There is no compulsion to report data to *Bankscope*, and the propensity to report data consistently, even when it reveals an increase in bank fragility, may be a function of local culture associated with expectations around accounting standards.

The United States (Table 21) is the nation with the largest number of banks in the dataset, has a high level of economic development and a well supervised banking system. All selection rules entail the full 15 annual observations of each variable, and alternative rules produce similar sample statistics. For some variables (for example ROAA) the consistency is even greater than in Argentina and Indonesia.

In Ukraine (Table 22) there are also 15 observations for all variables, regardless of the selection rule. The variability in sample statistics is of a similar order of magnitude to that in Argentina and Indonesia, and greater than in the United States. However, unlike in Argentina and Indonesia, there is no obvious connection between the strictness of the rule and the implied level of fragility.

5.3 Principal component analysis of the variation due to selection rules

Table 23 provides further information on the relative importance of the selection rule for the sample statistics of each variable, focussing on the eight countries discussed in the previous section. For each variable and for each country, the table reports the first principal component of the five different measures of the variable.

Table 23 shows that the highest level of consistency is in South Africa,

Table 23: Explained variation of the first principal component

	Equity	Impaired Loans	Cost to income	ROAA	Net Loans
Whole Sample	0.82	0.95	0.87	0.92	0.91
Argentina	0.65	0.99	0.99	0.99	0.99
Indonesia	0.99	0.99	0.77	0.99	0.99
Libya	0.96	N/A	0.82	0.92	0.98
Netherlands	0.88	0.83	0.68	0.89	0.86
Nigeria	0.94	0.89	0.91	0.98	0.60
South Africa	0.99	0.99	0.99	0.98	0.98
United States	0.90	0.99	0.96	0.99	0.91
Ukraine	0.88	0.99	0.65	0.96	0.99

with the first principal component explaining at least 98% of the variation in the measures in all cases. The figures for the United States are almost as high. While the figures for other countries are generally in excess of 90%, each of the other countries has at least one variable with a much lower figure, around 60-70%. For most countries the outlier is managerial efficiency, but for Argentina it is bank capitalisation and for Nigeria it is net loans divided by total assets.

5.4 Correlations across the indicators of financial fragility

The eight different variables in our dataset capture different dimensions of financial fragility. Table 24 reports coefficients of correlation across the eight variables, providing information about how closely related these different dimensions are. The correlations are based on the whole dataset.

The table shows that in no case is the correlation very high. The coefficient with the largest absolute value (0.71) is for the correlation between two variables based directly on elements of the banks' balance sheet: net loans divided by total assets and liquid assets divided by total assets. Other correlations are very much lower, the next largest coefficient (0.32) being for bank capitalisation and ROAA. Each of the variables appears to capture a different element of financial fragility. Therefore, whether a banking system is considered fragile depends very much upon which dimensions of fragility are given the most weight.

Table 24: Correlations between the financial fragility indicators

	Equity	Impaired Loans	Cost to Income	Return on Av. Assets	Net Loans	Liquid Assets	Net Charge Offs	Z-Score
Equity	1							
Impaired Loans	-0.07	1						
Cost to Income	-0.04	0.16	1					
Return on Av. Assts	0.32	-0.18	-0.28	1				
Net Loans	-0.01	-0.18	-0.10	-0.08	1			
Liquid Assets	0.02	0.17	0.01	0.11	-0.71	1		
Net Charge Offs	0.01	0.12	0.19	-0.09	-0.17	0.10	1	
Z-Score	0.24	-0.13	-0.17	0.10	0.16	-0.15	-0.12	1

5.5 Advantages of including additional bank-types

Whereas existing financial sector datasets focus exclusively on commercial banks, this database includes five additional types of institutions, comprising cooperative banks, investment banks, Islamic banks, real estate and mortgage banks and savings banks. Neglecting these additional types of banks can lead to misleading conclusions about the level of fragility in the financial system. The pivotal role played by investment banks and real estate and mortgage banks in the latest global financial crisis is well known, Bordo (2009). It is, therefore, likely that their omission may lead to under-measurement of financial fragility. Alternatively, in countries such as Germany, where savings banks are more prevalent (and are generally more risk-averse than commercial banks), their omission may result in over-measurement of financial fragility.

To illustrate some of the advantages of including additional bank types, we also constructed the financial fragility indicators using just commercial banks and made comparisons with our measures for a range of representative countries. What we found was that unless the financial system is almost completely dominated by commercial banks, there were very large differences between the indicators. For countries such as Argentina, Brazil and Indonesia, where commercial banks represent over 95% of total banking assets, the omission of other bank types does not matter. However, the differences are quite considerable even for countries in which commercial banking assets represent 80% of total assets. The case of the Netherlands provides a good illustration of this point. In the Netherlands, commercial banking assets represent 79.8% of total banking assets, while cooperative banks represent 17.5%; real estate and mortgage banks have a 1.7% share and investment banks 0.9%. While most of the fragility indicators do not change much when all bank types are included, the Z-score for the Netherlands jumps from 9.2 for commercial banks to 13.4, indicating a much less fragile banking system than is suggested by looking at commercial banks alone.[19]

Not surprisingly, in countries where commercial banks have even lower shares in total banking assets, the comparison between our measures and this obtained by focussing on commercial banks alone reveals even greater differences. We use the examples of the United States and Germany to illustrate this point but also to show that focussing on commercial banks alone can lead to both under-measurement or over-measurement of financial fragility.

In the United States, investment banks and real estate and mortgage banks hold 22.0% and 10.7%, respectively, of total banking assets while commercial banks account for 58.4% and savings banks for 7.8%. Focussing on commercial banks alone, leads to under-measurement of financial fragility. Specifically, average capitalisation is 2.0 percentage points higher for commercial banks than for all banks, impaired loans lower by 0.6 percentage points and the Z-score climbs from 17.2 to 26.5 when other bank types are

[19]This finding raises the interesting research hypothesis, whether the presence of cooperative banks in a banking system contributes to financial stability.

excluded.

In Germany commercial banks hold 42.4% of total banking assets, while savings banks hold 25.6%, cooperative banks 14.9%, real estate and mortgage banks 14.0% and investment banks 3.1%. Germany provides an example in which financial fragility would be over-estimated if additional bank types are excluded. Bank capitalisation increases by 0.6 percentage points on average while the Z-score more than doubles, jumping from 14.1 to 29.8 when other bank types are included.

Overall, these comparisons show that financial fragility can be substantially mis-measured if one utilises indicators that focus exclusively on commercial banks.

6 Conclusion

This paper provides a description of a new country-level dataset on financial fragility based on data for individual banks reported in *Bankscope*. The dataset includes eight different country-level indicators of financial fragility, including a bank capitalisation measure, an asset quality indicator, a managerial efficiency measure, an asset return measure, two different liquidity indicators, a measure of risk exposure and an overall indicator of financial stability.

Particular attention is given to the issues arising from the fact that banks are under no compulsion to report data, and that the propensity to report may be correlated with bank characteristics, or changes in bank characteristics. Although there is no one straightforward solution to these problems, they can be mitigated by using alternative rules for the inclusion of individual banks in the sample, and comparing results using different rules. This facility for robustness checks is an original and distinctive characteristic of the dataset. Furthermore, by covering a wide range of financial institutions (not just commercial banks), the dataset provides an overview of financial development and financial fragility that is broad in scope.

It is intended that this dataset will be used both for academic research and to inform policy-making. In the future, analysis of the dataset might inform questions such as: how financial fragility influences economic growth, whether countries that liberalise their financial systems too quickly become more vulnerable to financial fragility, and whether there are indicators of fragility that can be used for predicting financial crises.

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Appendix

Table I: Country list

Albania	Algeria	Angola
Argentina	Australia	Austria
Azerbaijan	Bangladesh	Belarus
Belgium	Benin	Bolivia
Botswana	Brazil	Bulgaria
Burkina Faso	Burundi	Cameroon
Canada	Cape Verde	Central African Republic
Chad	Chile	China
Colombia	Congo	Dem. Rep Congo
Costa Rica	Cote d'Ivoire	Czech Republic
Denmark	Djibouti	Dominican Republic
Ecuador	Egypt	El Salvador
Equatorial Guinea	Eritrea	Estonia
Ethiopia	Finland	France
Gabon	Gambia	Georgia
Germany	Ghana	Greece
Guatemala	Guinea	Guinea-Bissau
Hong Kong	Hungary	India
Indonesia	Ireland	Israel
Italy	Jamaica	Japan
Jordan	Kazakhstan	Kenya
Korea (Rep)	Kyrgyzstan	Latvia
Lesotho	Liberia	Libya
Lithuania	Madagascar	Malawi
Malaysia	Mali	Mauritania
Mauritius	Mexico	Morocco
Mozambique	Namibia	Nepal
Netherlands	New Zealand	Nicaragua
Niger	Nigeria	Norway
Pakistan	Paraguay	Peru
Philippines	Poland	Portugal
Romania	Russia	Rwanda
Sao Tome & Principe	Senegal	Seychelles
Sierra Leone	Singapore	South Africa
Spain	Sri Lanka	Sudan
Swaziland	Sweden	Switzerland
Taiwan	Tanzania	Thailand
Togo	Tunisia	Turkey
Uganda	Ukraine	United Kingdom
United States	Uruguay	Uzbekistan
Venezuela	Vietnam	Zambia
Zimbabwe		

Table II: Full variable definitions in Bankscope

Variable	Components
Loans (2000)	Residential mortgage loans that are secured by property, non-residential loans or total mortgage loans with no breakdown, other consumer and retail loans/leases to individuals either secured or unsecured by assets other than residential property (including personal loans and credit cards), corporate and commercial loans to enterprises (business loans), all other loans and leases that do not fall into any other category (including leased assets, bills of exchange) **minus** reserves for possible losses on impaired loans.
Total Assets (2025)	Total loans, securities lent out or used as collateral for funding proposes, all securities and assets classified as "held for trading" excluding derivatives, all in the money trading derivatives recognised for hedging less the value of netting arrangements, investment securities designated as available for sale recorded at fair value, investment securities held to maturity at cost value, stakes in associated companies and subsidiaries, all other securities not classified above, investments in property, cash and non-interest earning balances with central banks, real estate acquired as a result of foreclosure on a loan secured by property, fixed assets (property etc.), goodwill net of impairment, intangible assets excluding goodwill (patents and copyrights etc.), tax assets to be refunded for the current year, deferred tax assets, assets of a business which has been sold or written off, any other assets not categorised (e.g. prepayments).

Equity (2055)	Common shares and premium, retained earnings, statuary reserves and reserves held for general banking risks, loss absorbing minority interests, reserves available for sale, foreign exchange reserves, other revaluation reserves, and preference shares and hybrid capital accounted for as capital, redeemable capital in cooperative banks.
Total liabilities and equity (2060)	Common shares and premium, retained earnings, statuary reserves and reserves held for general banking risks, loss absorbing minority interests, reserves available for sale, foreign exchange reserves, other revaluation reserves, hybrid capital (no breakdown provided), and the sum of all financial liabilities.
Loan loss reserves (2070)	Reserves against possible losses on impaired loans, accumulated credit provisions for off-balance sheet items such as guarantees (securities reserves).
Net Interest Revenue (2080)	Interest and commission received on loans, advances and leasing, interest income from the trading book, short-term funds and investment securities excluding insurance related interest, dividend income from trading and available for sale and held to maturity investments **minus** interest paid to customers' deposits including commission fees and transaction costs, interest paid on debt securities and other borrowed funds excluding insurance related interest expenses if separately identified, preferred dividends paid and declared.
Other Operating Income (2085)	Net gains (losses) on items disclosed as trading assets/portfolio in the accounts, gains (losses) on trading derivatives, net gains (losses) on items input into "available for sale securities" "held to maturity securities" or "other securities", net gains (losses) on assets disclosed as "assets at fair value through income", share of profit from associates and others under equity accounting.

Overhead costs (2090)	Includes wages, salaries, social security costs, pension costs, and other staff costs including expensing of staff stock options, depreciation, amortisation, administrative expenses, occupancy costs, software costs, operating lease rentals, audit and professional fees, other administrative operating expenses.
Net Income (2115)	Pre-impairment operating income, share of profit from associate and others under equity accounting (when not operating), extra-ordinary income that is not regularly earned (gain on disposal of subsidiary or fixed assets), income that reoccurs although is not part of the banks' core business **minus** loan impairment charges, other credit impairment charges, non-recurring expenses (goodwill impairment, loss on disposal of subsidiary / fixed assets), expenses that reoccur but are not part of a banks' core business, taxes (no details provided).
Impaired Loans (2170)	Includes impaired loans stated in the bank's accounts. According to the Fitch Universal Model used in Bankscope, this includes the total value of the loans that have a specific impairment against them. This includes, non-accrual loans, restructured loans, watchlist loans and any loans 90 days overdue. Some banks may not include restructured or watchlist loans. Some loans may be classed in more than one category. Moreover, non-performing loans and charge offs are driven by national regulations and may not be directly comparable across countries. In fact, even within Europe there are huge differences, something the European Banking Authority (EBA) is currently addressing.

Table III: The number of banks in Africa

Country Name	**Frequency**	**Country Name**	**Frequency**
Nigeria	96	Burkina Faso	10
South Africa	59	Mali	10
Kenya	56	Benin	9
Egypt	39	Gambia	9
Tanzania	34	Namibia	8
Ghana	33	Rwanda	8
Zimbabwe	29	Burundi	7
Sudan	25	Niger	7
Mauritius	22	Togo	7
Uganda	22	Gabon	6
Tunisia	21	Madagascar	6
Zambia	21	Chad	5
Morocco	20	Guinea	5
Algeria	19	Liberia	5
Cote d'Ivoire	18	Seychelles	5
Angola	17	Swaziland	5
Malawi	15	Cape Verde	4
Mozambique	15	Congo	4
Democratic Republic of Congo	14	Lesotho	4
Cameroon	13	Eritrea	3
Senegal	13	Sao Tome and Principe	3
Sierra Leone	13	Central African Republic	2
Botswana	12	Djibouti	2
Ethiopia	11	Equatorial Guinea	2
Libya	11	Guinea Bissau	1
Mauritania	11	**Total**	**796**

Table IV: Variable name codes

Variable Code Name	**Definition**
Var	This is the base case where the variable uses all the information available. Therefore no rules are used in the construction of the country level data under this scenario.
VarR5	This variable requires that all five CAMELS financial variable ratios are reported simultaneously for a minimum of eight years (hence, a bank reports all five ratios simultaneously at least eight times) during its existence in the data set. If a bank reports other financial variables more frequently (e.g one variable is reported for the duration of the panel) then this data will be used in the construction of the country level variables for that particular variable.
VarH5	This variable requires that all five CAMELS financial variable ratios are reported simultaneously for a minimum of 66% of a banks duration during its presence in the dataset. A bank is assumed to enter the dataset the first year it reports any financial ratio and is assumed to remain in the dataset unless it provides a specified reason for leaving (for example becoming inactive or remaining active and leaving the Bankscope database). Hence, a bank that enters the database in 2004 (the first year it reports a financial variable), remains in the panel until the end and subsequently reports all five CAMELS variables simultaneously for six years, then its observations will be used in the construction of the country level data (as it reports in six of the nine years possible). Moreover, as before if it reports one of its financial ratios for more than the minimum six years (say annually) these observations will be used to construct the country level data, and not just purely the times all five CAMELS ratios are reported simultaneously.

VarR	For a banks data to be used in the construction of the country level data, this rule requires that a bank reports this variable at least eight times during the time series, regardless of the time the bank enters the database or whether or not the bank exits the database.
VarH	This rule requires that the selected variable is reported by the bank for at least 66% of the time during a banks duration in the panel. A bank is assumed to enter the panel the first year it reports a value, and exits the panel if it becomes inactive (specified in the Bankscope data) or is active but leaves the Bankscope database, where the year it leaves is assumed as the last year the bank reports.

Notes: Var may represent any variable used in the study e.g. impaired loans divided by total assets, cost to income ratio or net loans divided by total assets etc.

Table V: The cumulative number of banks entering by country and by year

Country Name	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Max Poss
Albania	1	4	4	4	5	5	5	5	7	10	10	12	15	15	15	15
Algeria	5	7	8	10	10	13	16	16	18	18	19	19	19	19	19	19
Angola	2	3	3	5	6	8	8	9	12	12	13	15	17	17	17	17
Argentina	81	91	98	104	108	108	109	109	113	113	115	115	115	115	115	134
Australia	27	28	28	28	28	28	33	69	87	90	91	92	93	93	93	102
Austria	122	140	164	187	197	239	277	293	320	327	332	344	355	356	356	369
Azerbaijan	7	8	12	13	16	18	19	21	22	25	28	28	28	31	31	31
Bangladesh	11	14	15	15	15	15	17	17	18	18	19	25	35	39	39	39
Belarus	4	8	11	11	12	14	15	16	17	20	22	24	29	29	29	29
Belgium	54	56	59	65	72	74	74	82	85	86	89	90	90	90	90	114
Benin	4	4	4	5	6	6	7	8	9	9	9	9	9	9	9	9
Bolivia	10	10	10	10	10	10	10	10	10	10	11	12	15	15	15	17
Botswana	1	2	2	2	2	4	6	8	8	10	11	11	11	12	12	12
Brazil	114	127	143	159	168	169	174	178	188	198	201	209	215	215	215	233
Bulgaria	12	13	14	15	16	17	18	22	23	24	26	27	30	30	30	32
Burkina Faso	4	7	7	7	7	7	8	8	9	9	10	10	10	10	10	10
Burundi	5	5	5	6	7	7	7	7	7	7	7	7	7	7	7	7
Cameroon	7	8	8	8	10	10	10	12	12	12	13	13	13	13	13	13
Canada	31	32	36	44	45	51	54	56	59	60	60	61	103	117	117	124
Cape Verde	0	0	0	0	0	0	0	0	0	0	3	4	4	4	4	4
Central African Republic	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Chad	2	2	3	3	3	3	4	4	5	5	5	5	5	5	5	5
Chile	9	9	9	10	11	11	11	11	11	11	35	35	35	42	42	44
China	16	19	25	32	43	52	65	84	114	139	153	167	182	184	186	187
Colombia	32	33	36	38	38	39	39	43	45	50	55	55	58	60	66	71
Congo	0	0	1	1	1	1	1	1	1	3	4	4	4	4	4	4
Costa Rica	18	19	27	31	31	34	57	60	61	62	64	65	65	67	67	71
Cote d'Ivoire	9	11	11	11	12	14	16	16	17	18	18	18	18	18	18	18
Czech Republic	16	19	22	22	23	24	30	32	34	34	36	37	37	37	37	43
Democratic Rep. Congo	2	2	4	4	5	6	6	9	9	10	11	12	12	14	14	14
Denmark	62	69	73	75	77	78	93	106	111	112	139	142	145	148	148	149
Djibouti	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dominican Rep.	9	12	25	25	46	46	48	48	50	50	51	53	63	77	77	77
Ecuador	6	6	31	34	34	34	34	34	34	34	34	37	38	41	41	44
Egypt	31	32	32	32	33	33	33	33	34	35	36	37	38	39	39	39
El Salvador	10	10	13	15	15	15	15	16	17	18	18	18	20	20	22	22
Equatorial Guinea	0	0	0	0	0	1	1	1	1	1	2	2	2	2	2	2
Eritrea	1	1	2	2	2	2	2	3	3	3	3	3	3	3	3	3
Estonia	4	4	4	4	5	5	7	7	8	9	9	9	10	10	10	18
Ethiopia	5	5	6	6	6	7	7	7	7	8	8	10	11	11	11	11
Finland	6	6	6	7	7	9	12	18	19	20	22	23	24	24	24	25
France	229	254	265	271	281	289	322	387	408	420	438	440	465	465	465	512
Gabon	2	2	2	2	3	4	4	5	5	5	5	5	6	6	6	6
Gambia	1	3	3	3	3	4	5	5	7	7	7	8	9	9	9	9
Georgia	6	10	10	10	11	11	12	12	13	16	16	16	16	16	16	16
Germany	1983	2080	2129	2173	2191	2211	2244	2409	2422	2433	2441	2448	2458	2462	2462	2605
Ghana	3	3	3	3	4	4	5	6	8	22	27	30	31	32	32	33
Greece	7	7	8	9	10	11	24	28	29	30	30	30	31	31	31	35

Guatemala	29	31	31	32	32	32	32	34	34	35	36	36	37	37	38	40
Guinea	1	2	3	3	3	3	3	3	3	4	4	4	4	4	4	5
Guinea Bissau	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
Hong Kong	26	27	31	33	34	36	63	79	82	86	89	90	91	91	91	102
Hungary	20	25	28	31	34	35	37	42	43	45	48	49	51	52	52	55
India	53	58	60	73	80	85	89	93	100	102	104	104	105	105	105	106
Indonesia	62	67	69	69	70	77	81	85	89	92	94	97	98	98	98	132
Ireland	21	22	23	23	23	24	34	47	52	53	53	55	55	55	55	58
Israel	17	19	19	20	20	20	20	20	20	20	20	20	20	20	20	20
Italy	139	150	156	175	179	184	193	803	828	849	862	870	892	897	897	928
Jamaica	2	2	3	3	11	12	15	16	16	16	16	16	16	18	18	20
Japan	786	826	837	852	870	875	882	887	895	903	903	905	916	916	916	929
Jordan	15	15	15	15	15	15	15	17	17	17	18	19	19	19	19	19
Kazakhstan	14	16	18	19	22	25	29	29	29	31	35	37	37	37	37	38
Kenya	30	31	33	35	36	37	41	42	42	47	47	48	49	50	50	56
Kyrgyzstan	0	0	5	5	6	6	6	7	7	8	8	8	8	8	8	10
Latvia	8	9	11	13	14	17	20	22	23	23	23	25	26	26	27	32
Lesotho	2	2	3	3	3	3	3	3	4	4	4	4	4	4	4	4
Liberia	0	0	0	0	0	0	0	0	2	3	4	4	4	4	4	5
Libya	2	5	5	6	7	7	8	8	8	8	9	10	10	11	11	11
Lithuania	6	9	10	10	10	11	11	12	13	13	13	15	15	15	15	16
Madagascar	2	4	5	5	5	5	5	5	5	6	6	6	6	6	6	6
Malawi	4	5	7	7	8	8	8	8	9	10	11	13	14	14	14	15
Malaysia	33	34	35	36	37	40	45	50	53	56	60	60	65	97	101	105
Mali	4	5	6	6	6	6	8	8	9	10	10	10	10	10	10	10
Mauritania	4	4	5	5	7	7	7	8	9	9	9	9	10	11	11	11
Mauritius	5	6	7	8	9	13	13	16	17	18	18	20	21	22	22	22

Mexico	28	30	34	36	38	40	44	44	54	63	64	64	64	66	73	77
Morocco	6	6	6	6	6	6	6	8	8	14	15	16	17	18	18	20
Mozambique	3	3	4	6	7	7	7	7	7	12	14	14	15	15	15	15
Namibia	1	2	3	3	3	3	4	8	8	8	8	8	8	8	8	8
Nepal	8	9	9	10	11	14	14	14	14	16	20	22	25	29	29	29
Netherlands	26	27	27	28	32	32	43	50	54	56	60	65	67	67	67	79
New Zealand	3	3	3	4	5	6	7	12	23	25	25	25	30	30	30	33
Nicaragua	8	9	9	9	11	11	11	11	12	12	13	14	14	15	15	15
Niger	1	2	3	3	4	4	5	5	6	6	6	6	6	6	6	7
Nigeria	47	55	59	66	68	70	72	75	76	78	78	81	88	94	94	96
Norway	11	13	17	19	25	40	58	112	132	135	144	156	161	165	165	170
Pakistan	15	21	21	24	25	31	34	44	47	49	50	53	55	56	57	57
Paraguay	21	21	21	21	21	21	21	21	21	24	25	25	27	27	27	30
Peru	20	22	23	23	23	23	27	28	29	29	31	31	33	33	33	34
Philippines	9	9	9	11	13	14	32	57	60	61	62	62	62	62	62	66
Poland	19	23	24	25	28	31	48	55	59	61	67	70	73	74	74	81
Portugal	16	16	18	19	20	20	26	45	48	50	53	53	56	56	56	58
Republic of Korea	10	10	15	16	18	27	27	32	33	34	34	43	61	61	61	85
Romania	14	17	20	20	24	25	28	29	30	32	33	35	37	37	37	38
Russia	25	53	82	117	147	171	527	735	945	1026	1033	1125	1156	1159	1159	1186
Rwanda	2	2	2	3	3	4	4	4	4	5	6	8	8	8	8	8
Sao Tome and Principe	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	3
Senegal	4	7	7	8	10	10	10	10	11	12	12	12	13	13	13	13
Seychelles	1	1	1	1	1	1	1	3	3	3	3	4	5	5	5	5
Sierra Leone	3	4	5	5	5	5	6	7	8	11	13	13	13	13	13	13
Singapore	23	26	29	29	31	35	43	51	55	58	59	59	59	59	59	67
South Africa	15	19	20	21	21	21	35	39	45	47	49	49	51	51	51	59

Spain	38	38	45	46	47	47	92	227	231	234	240	246	256	260	261	269
Sri Lanka	9	10	10	11	13	15	15	16	16	16	17	17	18	18	18	18
Sudan	7	8	13	14	15	15	15	19	21	22	24	25	25	25	25	25
Swaziland	2	3	3	3	4	5	5	5	5	5	5	5	5	5	5	5
Sweden	10	13	16	95	99	99	103	111	116	117	120	123	127	127	127	130
Switzerland	234	241	265	313	396	425	471	483	486	489	494	500	503	503	503	545
Taiwan	18	23	32	37	42	43	49	67	72	75	76	76	78	81	82	82
Thailand	14	18	21	29	32	32	34	37	37	41	41	41	43	43	43	58
Togo	3	3	3	4	4	4	4	5	7	7	7	7	7	7	7	7
Tunisia	7	7	8	9	10	16	17	17	19	19	20	20	21	21	21	21
Turkey	18	35	36	37	40	41	44	48	60	64	65	65	67	67	68	69
Uganda	8	9	10	12	12	12	12	12	13	15	18	19	19	19	19	22
Ukraine	5	10	11	16	18	22	23	26	29	31	31	33	34	35	190	191
United Kingdom	148	155	160	169	178	189	229	287	299	311	325	329	342	348	349	377
United Rep. of Tanzania	2	2	2	2	2	2	6	17	21	24	25	28	31	33	33	34
United States of America	761	2799	2864	2915	2952	2986	3012	3055	3082	3116	3139	3157	3166	3172	3202	10671
Uruguay	17	20	28	45	46	47	48	48	49	49	49	49	50	50	50	52
Uzbekistan	2	5	6	6	6	9	10	12	12	13	16	19	21	24	24	24
Venezuela	20	65	70	72	73	74	76	76	76	76	76	79	79	79	79	80
Vietnam	7	9	10	10	14	15	17	19	30	32	38	48	52	52	52	52
Zambia	10	11	12	13	13	14	15	17	17	18	18	20	21	21	21	21
Zimbabwe	3	3	8	10	14	14	15	15	15	15	15	26	27	28	28	29
Total	5942	8460	8915	9414	9811	10137	11089	12806	13417	13803	14103	14422	14785	14942	15155	23287

Notes: This table includes the cumulative amount of banks that enter the database by reporting at least one financial variable. The final column shows the total number of banks in a country. Hence, if the figure in 2012 is less than the figure in the final column, the difference is the number of banks that fail to report a variable throughout the duration of the panel.

Table VI: The cumulative number of banks exiting by country and by year

Country Name	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Albania	0	0	0	0	0	0	0	0	0	0	1	1	2	2	2
Algeria	0	0	0	0	0	1	1	2	3	3	3	3	4	4	4
Angola	0	0	0	0	0	0	0	0	1	1	1	1	2	2	2
Argentina	2	16	23	28	37	40	40	41	43	47	48	51	56	57	57
Australia	0	3	9	14	18	21	23	26	29	36	44	49	52	52	57
Austria	0	3	5	12	16	19	25	33	38	58	73	85	103	108	113
Azerbaijan	0	0	1	1	5	5	6	8	8	8	9	9	10	10	11
Bangladesh	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
Belarus	0	0	0	3	4	4	4	5	5	6	6	6	7	7	7
Belgium	0	4	9	14	18	23	27	33	36	38	41	47	49	50	53
Benin	0	0	0	0	0	0	2	2	2	2	3	5	6	6	6
Bolivia	1	2	2	2	2	2	2	2	3	3	3	4	4	4	4
Botswana	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
Brazil	2	7	16	22	34	37	42	46	53	61	70	81	89	91	92
Bulgaria	0	0	1	1	1	1	1	2	4	7	7	8	9	9	9
Burkina Faso	0	0	0	0	0	0	0	1	1	2	2	4	5	5	5
Burundi	0	0	0	0	1	1	1	1	3	3	3	3	5	5	5
Cameroon	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2
Canada	0	5	9	15	21	21	22	22	25	27	30	35	47	47	48
Cape Verde	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Central African Republic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Chile	1	1	2	2	4	4	5	6	6	6	6	6	6	6	6
China	0	0	0	7	7	7	7	7	8	15	15	17	19	22	23
Colombia	0	11	15	18	20	20	21	27	31	32	32	32	32	32	32
Congo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Costa Rica	1	1	4	7	8	9	11	13	13	15	17	17	17	17	17
Cote d'Ivoire	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
Czech Republic	0	2	4	5	5	6	6	8	8	10	11	11	11	11	11
Democratic Rep. Congo	0	0	0	1	1	1	1	1	1	1	1	1	1	2	2
Denmark	0	0	2	7	11	13	14	16	17	20	26	31	35	43	56
Djibouti	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dominican Rep.	0	0	2	4	7	8	9	10	11	11	11	11	11	11	11
Ecuador	0	2	5	5	5	5	5	5	5	6	6	6	6	6	6
Egypt	0	0	0	0	0	0	1	3	9	9	10	11	11	11	11
El Salvador	0	0	2	4	4	4	4	5	5	5	6	6	6	6	6
Equatorial Guinea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eritrea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Estonia	0	0	0	0	0	0	0	0	1	2	2	2	2	2	2
Ethiopia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Finland	0	0	2	6	6	6	6	6	6	6	7	8	9	9	9
France	4	18	32	53	78	103	116	135	153	173	190	206	214	221	226
Gabon	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
Gambia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Georgia	0	0	0	1	2	2	2	3	4	4	4	4	4	4	4
Germany	8	78	224	353	457	557	609	658	695	730	787	833	861	879	907
Ghana	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3
Greece	0	1	5	5	7	7	7	7	8	10	10	10	10	12	15
Guatemala	1	2	4	5	5	7	7	7	8	9	10	10	10	10	10

Guinea	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Guinea Bissau	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hong Kong	0	0	5	9	11	13	18	21	22	24	26	26	26	26	26
Hungary	1	1	2	4	7	7	9	10	12	14	16	20	24	26	26
India	0	0	1	2	4	5	6	8	10	12	14	14	16	16	16
Indonesia	0	3	5	10	15	18	19	20	20	20	23	23	24	25	25
Ireland	0	2	5	6	10	14	15	16	16	19	22	24	33	34	34
Israel	0	1	1	1	4	6	8	8	8	8	8	8	8	8	9
Italy	0	6	30	53	103	142	158	166	181	194	219	238	262	285	324
Jamaica	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2
Japan	8	40	75	90	141	169	193	205	216	223	225	229	233	233	238
Jordan	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Kazakhstan	0	0	0	3	4	4	4	5	5	5	5	5	5	5	5
Kenya	1	2	2	4	4	5	5	9	9	9	9	9	10	10	10
Kyrgyzstan	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Latvia	0	1	2	3	3	3	3	3	3	4	4	4	4	4	4
Lesotho	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Liberia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Libya	0	0	0	0	0	0	0	0	0	0	2	3	4	4	4
Lithuania	0	1	2	3	3	3	3	3	3	3	3	3	3	3	4
Madagascar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malawi	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
Malaysia	0	1	3	13	15	16	17	17	24	24	24	26	26	28	29
Mali	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
Mauritania	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Mauritius	0	0	0	0	1	1	1	2	2	2	4	4	4	4	4
Mexico	1	3	4	6	8	10	11	11	11	11	11	11	11	11	11

Morocco	0	0	0	0	0	1	2	2	2	2	2	2	3	3	3
Mozambique	0	0	0	1	1	2	2	2	2	2	2	2	2	2	2
Namibia	0	0	0	0	1	2	2	2	2	2	2	2	2	2	2
Nepal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Netherlands	1	2	5	6	10	13	14	17	21	24	26	27	31	34	36
New Zealand	1	1	1	2	2	2	3	3	4	4	4	4	4	5	5
Nicaragua	0	1	3	3	4	6	6	7	7	7	7	8	8	8	8
Niger	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nigeria	1	2	3	6	9	14	14	30	61	62	62	63	63	65	66
Norway	0	1	1	2	6	7	8	12	13	13	16	20	23	25	27
Pakistan	0	0	1	1	2	3	4	4	8	11	11	12	13	15	15
Paraguay	1	2	2	4	6	9	9	9	9	9	9	9	9	10	10
Peru	1	7	7	8	8	9	10	12	13	13	13	13	13	13	13
Philippines	0	1	6	7	8	8	9	11	14	15	16	16	16	17	18
Poland	0	2	3	6	7	11	15	18	19	20	22	25	28	31	33
Portugal	0	0	4	6	7	7	10	11	12	12	12	14	15	16	17
Republic of Korea	0	1	3	5	7	7	7	8	11	11	11	11	12	12	12
Romania	0	1	2	2	5	5	5	5	6	7	7	7	7	7	8
Russia	0	1	2	6	9	12	20	29	42	78	122	159	221	247	255
Rwanda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sao Tome and Principe	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Senegal	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sierra Leone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Singapore	2	8	11	13	18	21	23	23	26	26	27	30	31	31	32
South Africa	0	1	3	6	9	17	18	19	19	19	19	19	20	20	20
Spain	0	8	17	24	28	33	42	46	48	51	59	75	98	112	143

Sri Lanka	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Sudan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
Swaziland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sweden	0	0	0	0	1	2	6	11	18	28	39	40	43	43	43
Switzerland	3	12	22	36	51	67	75	90	96	117	138	160	180	188	193
Taiwan	0	0	0	0	1	2	2	5	7	11	13	14	14	15	15
Thailand	0	1	1	1	3	3	4	5	5	5	5	6	6	7	7
Togo	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Tunisia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turkey	0	0	1	15	23	25	26	27	28	28	28	28	28	30	30
Uganda	0	0	0	0	1	1	1	1	1	2	2	2	2	2	2
Ukraine	1	1	1	1	1	1	1	1	2	4	4	6	6	7	9
United Kingdom	3	8	15	30	34	42	50	59	66	74	82	85	97	103	108
United Rep. of Tanzania	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
United States of America	5	31	97	148	190	246	355	445	549	659	749	815	894	948	1033
Uruguay	0	0	2	2	7	12	13	13	14	14	14	14	14	17	17
Uzbekistan	0	0	0	0	0	0	0	2	2	2	2	2	3	3	4
Venezuela	0	3	6	8	16	17	17	17	17	17	18	21	25	26	27
Vietnam	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4
Zambia	0	0	0	1	1	1	2	2	2	2	2	2	2	2	2
Zimbabwe	0	0	1	3	4	5	7	9	11	11	11	11	11	11	11
Total	54	317	740	1161	1604	1970	2290	2615	2956	3314	3681	4003	4373	4584	4851

Notes: This table includes the cumulative amount of banks that leave the database pending that they entered the database by reporting any financial ratio. Banks that leave have become inactive, or remain active but state that they leave the Bankscope database. In this instance they are classed as inactive the final year they report a financial ratio.

A note on Islamic banking

One category of bank in *Bankscope* is Islamic banks, this category appearing in 15 of the 124 countries. Table VII shows the prevalence of Islamic banks relative to other banks. In only the Gambia, Jordan, Pakistan, Malaysia, Mauritania and Sudan does the number of Islamic banks exceed 10% of the total number of banking institutions in the country, and in no country does it exceed 50% (Sudan is the closest, with a figure of 48%). The relative size of the Islamic banking sector in each country is shown in the final column of the table. Here, size is measured by mean total assets over the sample period. In only three cases does the share of total assets exceed 10%.

Table VII: Islamic bank prevalence

Country Name	**Islamic Bank Frequency**	**Bank Numbers**	**Bank Percent**	**Share of Total Assets Percent**
Bangladesh	2	39	5.13	1.88
Egypt	3	39	7.69	4.01
Gambia	1	9	11.11	3.19
Indonesia	3	132	2.27	2.24
Jordan	3	19	15.79	3.83
Malaysia	18	105	17.14	11.42
Mauritania	2	11	18.18	11.63
Pakistan	9	57	15.79	3.68
Philippines	1	66	1.52	0.01
Russia	1	1,186	0.08	0.00
Singapore	1	67	1.49	0.10
Sudan	12	25	48.00	43.05
Tunisia	1	21	4.76	1.06
Turkey	5	69	7.25	4.15
United Kingdom	5	377	1.33	0.01

Notes: Certain institutions failed to report total asset data which included: Indonesia (35), Malaysia (6), Pakistan (1), Philippines (5), Russia (27), Singapore (8), Turkey (1), United Kingdom (43).