

3.1 Data

Appendices I: Sample countries mean values of INDV, Z score, ROE, and POLCON

| country | INDV | Z Score | ROE | POLCON |
|--------------------------|----------|----------|----------|----------|
| Algeria | 0.084634 | 0.051825 | 0.052959 | 0.228935 |
| Angola | 0.153493 | 0.012236 | 0.098927 | 0.106746 |
| BENIN | 0.094234 | 0.027126 | 0.069007 | 0.131099 |
| botswana | 0.024848 | 0.012478 | 0.166264 | 0.127082 |
| Burkina Faso | 0.094168 | 0.010676 | 0.120783 | 0.180057 |
| Burundi | 0.148666 | 0.020786 | 0.089618 | 0.205762 |
| Cameroon | 0.078469 | 0.009467 | 0.064013 | 0.369529 |
| Central African Republic | 0.264791 | 0.02605 | 0.255552 | 0.295364 |
| Chad | 0.171118 | 0.033245 | 0.133808 | 0.201769 |
| Congo, Dem. Rep. | 0.104496 | 0.012247 | 0.101592 | 0.217116 |
| Cote d'Ivoire | 0.06735 | 0.023609 | 0.073065 | 0.34766 |
| Djibouti | 0.100692 | 0.031187 | 0.128575 | 0 |
| Egypt, Arab Rep. | 0.146475 | 0.029812 | 0.048038 | 0.373263 |
| Equatorial Guinea | 0.35695 | 0.105602 | 0.128974 | 0.118017 |
| Ethiopia | 0.081646 | 0.013817 | 0.125356 | 0.194629 |
| Gabon | 0.183564 | 0.025258 | 0.068916 | 0.234284 |
| Gambia, The | 0.070557 | 0.008166 | 0.214357 | 0.265059 |
| Ghana | 0.041404 | 0.01193 | 0.167036 | 0.020847 |
| Guinea | 0.159677 | 0.025094 | 0.161744 | 0.087871 |
| Kenya | 0.058131 | 0.026516 | 0.053556 | 0.075197 |
| Lesotho | 0.062784 | 0.011504 | 0.099591 | 0.138722 |
| Liberia | 0.273707 | 0.046825 | 0.147777 | 0.287543 |
| Libya | 0.166542 | 0.124375 | 0.053211 | 0.189209 |
| Madagascar | 0.085126 | 0.007717 | 0.081183 | 0.274093 |
| Malawi | 0.065262 | 0.015616 | 0.073652 | 0.217863 |
| Mali | 0.07605 | 0.013836 | 0.059751 | 0.186865 |
| Mauritania | 0.079627 | 0.0488 | 0.034829 | 0.149489 |
| Mauritius | 0.155495 | 0.036232 | 0.052281 | 0.158644 |
| Morocco | 0.094394 | 0.035742 | 0.03631 | 0 |
| Mozambique | 0.138764 | 0.013056 | 0.372364 | 0.367639 |
| Namibia | 0.173131 | 0.158144 | 0.063248 | 0.121192 |
| Niger | 0.057402 | 0.020686 | 0.06707 | 0.195161 |
| Nigeria | 0.05508 | 0.026879 | 0.073189 | 0.209189 |
| Rwanda | 0.11966 | 0.018254 | 0.261483 | 0.109361 |
| Senegal | 0.109313 | 0.015825 | 0.066887 | 0.103031 |
| Seychelles | 0.236082 | 0.048911 | 0.239106 | 0.177045 |
| Sierra Leone | 0.082822 | 0.015183 | 0.26123 | 0.107201 |
| South Africa | 0.069387 | 0.069476 | 0.079102 | 0.299578 |
| Sudan | 0.120826 | 0.040541 | 0.084354 | 0.145701 |
| Tanzania | 0.074555 | 0.014845 | 0.145603 | 0.139834 |
| Togo | 0.084144 | 0.016735 | 0.287042 | 0.066537 |
| Tunisia | 0.066374 | 0.030998 | 0.038133 | 0 |
| Uganda | 0.112837 | 0.022556 | 0.143583 | 0.274894 |
| Zambia | 0.061766 | 0.013584 | 0.084898 | 0.163319 |
| Zimbabwe | 0.238818 | 0.014968 | 0.548058 | 0.200873 |

Source: author's calculations (2022).

4.1 Descriptive statistics

Table I: Descriptive statistics

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|----------|-----|-------|-----------|--------|----------|
| Zscore | 786 | .1312 | .089 | .0107 | .6341 |
| sdROA | 750 | .007 | .0135 | .0001 | .1712 |
| sdROE | 770 | .0653 | .1164 | .0001 | 1.1342 |
| NPLs | 531 | .0965 | .0747 | .0096 | .5105 |
| INDV | 779 | .4335 | .1408 | .0004 | .9275 |
| ROE | 783 | .2012 | .181 | -.3295 | 1.6192 |
| LIQ | 789 | .4283 | .24 | .0544 | 2.4061 |
| DTA | 779 | .7723 | .2099 | .0298 | 1 |
| OE | 783 | .571 | .1545 | .199 | 1.8987 |
| Reg-cap | 531 | .1788 | .0651 | -.0277 | .422 |
| Polcon | 539 | .4248 | .2067 | .022 | .769 |
| IF | 783 | .4177 | 8.7333 | -.098 | 244.1103 |
| GDP | 808 | .0465 | .0732 | -.6208 | 1.2314 |

Source: Authors' calculations (2022).

Table II: Correlation analysis

| Variables | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) |
|--------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|
| (1) zscore | 1.000 | | | | | | | | | | | | |
| (2) NPLs | 0.105 | 1.000 | | | | | | | | | | | |
| (3) sdROA | -0.113 | -0.031 | 1.000 | | | | | | | | | | |
| (4) sdROE | -0.187 | -0.030 | 0.727 | 1.000 | | | | | | | | | |
| (5) INDV | -0.054 | 0.034 | 0.050 | 0.058 | 1.000 | | | | | | | | |
| (6) ROE | -0.180 | -0.115 | 0.204 | 0.407 | 0.024 | 1.000 | | | | | | | |
| (7) LIQ | 0.007 | -0.079 | 0.140 | 0.130 | 0.246 | 0.148 | 1.000 | | | | | | |
| (8) OE | 0.023 | 0.049 | 0.084 | 0.034 | 0.489 | -0.193 | 0.217 | 1.000 | | | | | |
| (9) DTA | 0.174 | -0.034 | 0.012 | -0.030 | -0.141 | 0.009 | -0.195 | -0.022 | 1.000 | | | | |
| (10) IF | -0.053 | 0.017 | -0.014 | -0.017 | -0.091 | -0.039 | -0.053 | -0.106 | -0.113 | 1.000 | | | |
| (11) GDP | -0.045 | 0.007 | -0.050 | -0.058 | 0.099 | 0.056 | 0.046 | -0.017 | 0.027 | -0.044 | 1.000 | | |
| (12) Reg-cap | -0.019 | 0.596 | -0.063 | -0.081 | 0.078 | -0.087 | -0.021 | 0.072 | -0.069 | 0.035 | -0.005 | 1.000 | |
| (13) Polcon | -0.077 | -0.058 | -0.050 | -0.113 | 0.046 | -0.040 | -0.100 | 0.044 | 0.089 | -0.041 | -0.001 | 0.004 | 1.000 |

Source: Authors' calculations (2022)..

4.2 Regression results

Table III: Estimation results of the Impact of income diversification on bank stability (Z score, NPLs)

| Dependent Variables | Z Score | NPLs |
|---------------------|---------|------|
|---------------------|---------|------|

| Model Estimator | (1) OLS | (2) FE | (3) GMM | (4) GMM | (5) GMM | (6) OLS | (7) FE | (8) GMM |
|------------------|------------------------|-----------------------|------------------------|------------------------|-----------------------|-----------------------|-----------------------|------------------------|
| Lagt-1 | 0.8954*** (0.0152) | 0.5548*** (0.0277) | 0.6157*** (0.0267) | 0.5685*** (0.0381) | 0.640*** (0.0257) | 0.8504*** (0.0573) | 0.6867*** (0.1162) | 0.8502*** (0.0043) |
| INDV | 0.0554* (0.0289) | -0.0220** (0.0097) | 0.3378*** (0.0717) | 0.2700*** (0.0873) | 0.279*** (0.0721) | 0.0207 (0.0261) | 0.0475* (0.0242) | 0.0763*** (0.0037) |
| LIQ | 0.0229*** (0.0060) | 0.0379*** (0.0075) | 0.1053*** (0.0071) | 0.1141*** (0.0111) | 0.105*** (0.0059) | -0.0067* (0.0040) | 0.0022 (0.0076) | -0.012*** (0.0021) |
| OE | 0.0146 (0.0092) | -0.042*** (0.0105) | -0.1315*** (0.0201) | -0.1342*** (0.0208) | -0.117** (0.0194) | -0.0013 (0.0085) | -0.0083 (0.0107) | -0.0030 (0.0020) |
| DTA | 0.0047 (0.0058) | 0.0118 (0.0090) | 0.0129** (0.0054) | 0.0151** (0.0064) | 0.0132** (0.0057) | -0.0025 (0.0058) | -0.0180** (0.0087) | -0.0194*** (0.0026) |
| ROE | 0.0048 (0.0083) | 0.0258*** (0.0083) | -0.0893*** (0.0202) | -0.0996*** (0.0216) | -0.077*** (0.0179) | -0.0055 (0.0043) | 0.0012 (0.0052) | 0.0028*** (0.0009) |
| IF | -0.0001 (0.0002) | 0.0001 (0.0001) | 0.0012 (0.0023) | 0.0004 (0.0024) | 0.0010 (0.0024) | 0.002*** (0.0000) | 0.0002** (0.0001) | 0.001** (0.0014) |
| GDP | -0.0479*** (0.0178) | -0.0348** (0.0163) | -0.0736*** (0.0047) | -0.0727*** (0.0052) | -0.071*** (0.0042) | 0.038*** (0.0119) | 0.0415*** (0.0112) | -0.0344*** (0.0011) |
| Crisis | -0.0063 (0.1494) | -0.0131 (0.1370) | -0.0616* (0.0339) | -0.0625* (0.0334) | 0.0501* (0.0261) | 0.0287** (0.0146) | -0.0104 (0.0128) | 0.0224** (0.0096) |
| INDV^2 | -0.0851** (0.0332) | -0.0274** (0.0133) | -0.3492*** (0.0767) | -0.2775*** (0.0959) | -0.291*** (0.0789) | -0.0288 (0.0282) | -0.0661** (0.0290) | 0.093*** (0.0032) |
| INDV*crisis | 0.0177 (0.4136) | 0.0441 (0.3772) | 0.1156* (0.0924) | -0.1100 (0.0877) | -0.0783 (0.0662) | -0.0819** (0.0397) | 0.0388 (0.0388) | -0.0547* (0.0291) |
| Reg-cap | -0.0030 (0.0142) | -0.0028 (0.0183) | 0.0049 (0.0120) | 0.0038 (0.0128) | 0.0042 (0.0122) | 0.104*** (0.0295) | 0.1841*** (0.0569) | -0.1105*** (0.0035) |
| Polcon | -0.0041 (0.0052) | 0.0012 (0.0060) | -0.0103** (0.0045) | | | -0.0079* (0.0048) | 0.0028 (0.0077) | 0.0053*** (0.0017) |
| Political right | | | | -0.0035*** (0.0012) | | | | |
| polity | | | | | 0.0000 (0.0153) | | | |
| Constant | -0.3725 (0.5997) | 0.0197** (0.0096) | -1.8045*** (0.6049) | -1.5581** (0.6834) | -1.853*** (0.5760) | 0.8669* (0.4606) | -0.1176 (0.5879) | -0.0020 (0.0024) |
| Hansen (p-value) | | | 0.232 | 0.289 | 0.225 | | | 0.269 |
| AR1 (p-value) | | | 0.006 | 0.005 | 0.008 | | | 0.017 |
| AR2 (p-value) | | | 0.613 | 0.548 | 0.555 | | | 0.622 |
| Observation | 765 | 765 | 739 | 739 | 739 | 765 | 765 | 739 |
| R-squared | 0.8410 | 0.4179 | | | | 0.7930 | 0.6758 | |
| No. of id | | 45 | 45 | 45 | 45 | | 45 | 45 |

Source: Authors' calculations (2022). Notes: *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table IV: Estimation results of Impact of income diversification on bank stability (Z score, NPLs, *sd*ROA, *sd*ROE)

| Main explanatory Variables | INDV | | | | | | IDV-HHI | | | |
|----------------------------|-------------------------------|-------------------------------|------------------------------|------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|----------------------|--------------------------|
| | (1) <i>sd</i> ROA (OLS) | (2) <i>sd</i> ROE (OLS) | (3) <i>sd</i> ROA (FE) | (4) <i>sd</i> ROE (FE) | (5) <i>sd</i> ROA (GMM) | (6) <i>sd</i> ROE (GMM) | (7) <i>sd</i> ROA (GMM) | (8) <i>sd</i> ROE (GMM) | (9) NPLs (GMM) | (10) Z Score (GMM) |
| Lagt-1 | 0.394*** (0.0346) | 0.32*** (0.033) | 0.293*** (0.0367) | 0.224*** (0.0358) | 0.362*** (0.1287) | 0.245*** (0.0149) | 0.297*** (0.0182) | 0.160*** (0.0083) | 0.867*** (0.0103) | 0.551*** (0.0231) |
| INDV | -0.018** (0.0083) | -0.17** (0.072) | -0.027** (0.0095) | -0.1596* (0.0833) | -0.134** (0.0587) | -0.62*** (0.0751) | | | | |

| | | | | | | | | | | |
|------------------|----------------------|--------------------|----------------------|----------------------|-----------------------|-----------------------|-----------------------|----------------------|-----------------------|-----------------------|
| LIQ | 0.005*** (0.0017) | 0.0136 (0.014) | 0.010*** (0.0025) | 0.0337 (0.0219) | -0.0452** (0.0185) | -0.0104 (0.0175) | -0.027*** (0.0021) | 0.110*** (0.0259) | -0.06*** (0.0146) | 0.0120 (0.0118) |
| OE | 0.0046* (0.0027) | 0.068** (0.023) | 0.0055 (0.035) | 0.087*** (0.0304) | -0.0166 (0.0446) | -0.065** (0.0324) | -0.0019 (0.0015) | 0.091*** (0.0241) | 0.014*** (0.0051) | -0.081** (0.0180) |
| DTA | 0.0002 (0.0016) | -0.0076 (0.014) | 0.0039 (0.0028) | 0.0350 (0.0247) | -0.0277* (0.0158) | -0.0029 (0.0096) | 0.0036 (0.0027) | -0.0221 (0.0324) | -0.0011 (0.0075) | 0.0182* (0.0109) |
| ROE | 0.092*** (0.0024) | 0.19*** (0.021) | 0.123*** (0.0027) | 0.242*** (0.0237) | 0.0036 (0.0140) | 0.196*** (0.0146) | 0.0018* (0.0010) | 0.223*** (0.0094) | 0.023** (0.0011) | -0.0142 (0.0113) |
| IF | -0.0000 (0.0000) | 0.0000 (0.004) | -0.0000 (0.020) | -0.000 (0.004) | -0.0008 (0.0012) | -0.0018* (0.0011) | 0.108*** (0.0011) | 0.098*** (0.0117) | 0.081*** (0.0027) | 0.0003 (0.0064) |
| GDP | -0.0043 (0.0051) | -0.0583 (0.044) | -0.0027 (0.0052) | -0.0569 (0.0447) | -0.0008 (0.0047) | -0.31*** (0.0068) | -0.0008 (0.0013) | -0.102** (0.0208) | 0.038*** (0.0016) | -0.078** (0.0043) |
| Crisis | 0.097** (0.0427) | -0.1962 (0.369) | 0.12*** (0.0428) | -0.2337 (0.3711) | 0.11*** (0.0458) | 0.16*** (0.0290) | 0.394*** (0.0118) | -0.1135 (0.2452) | -0.0988 (0.1024) | -0.0145 (0.1700) |
| INDV^2 | 0.0166* (0.0095) | 0.194** (0.082) | 0.0121 (0.0110) | 0.1103 (0.0962) | 0.1247* (0.0649) | 0.696*** (0.0710) | | | | |
| INDV*Crisis | 0.2921** (0.1184) | 0.6336 (1.022) | 0.374*** (0.1181) | 0.7023 (1.0218) | -0.356*** (0.1377) | -0.615*** (0.0647) | | | | |
| Reg-cap | -0.0060 (0.0041) | -0.618* (0.035) | -0.126** (0.0062) | -0.20*** (0.0539) | -0.0072 (0.0178) | -0.0033 (0.0137) | -0.169** (0.0036) | -0.119** (0.0470) | 0.103*** (0.0060) | -0.0139 (0.0248) |
| Polcon | 0.0005 (0.0015) | -0.0138 (0.012) | 0.0006 (0.0019) | -0.0281* (0.0166) | 0.0099 (0.0072) | -0.0045 (0.0067) | 0.025*** (0.0009) | 0.16*** (0.0195) | 0.28*** (0.0036) | -0.058** (0.0213) |
| INDV-HHI | | | | | | | -0.041*** (0.0036) | 0.46301 (0.0499) | -0.053*** (0.0176) | -0.22*** (0.0283) |
| INDV-HHI^2 | | | | | | | 0.032** (0.0045) | 0.57*** (0.0812) | 0.083** (0.0179) | -0.359*** (0.0392) |
| INDV*Crisis | | | | | | | -0.058** (0.0166) | 0.3285 (0.3601) | 0.1463 (0.1501) | 0.0967* (0.2464) |
| Constant | -0.593** (0.1711) | -4.39** (1.483) | -0.764** (0.1853) | -5.876** (1.6083) | -2.03*** (0.7505) | 0.1770** (0.0181) | -1.416** (0.1400) | -6.041** (1.5309) | 2.407*** (0.6501) | 0.119*** (0.0205) |
| Hansen (p-value) | | | | | 0.278 | 0.518 | 0.511 | 0.365 | 0.375 | 0.933 |
| AR1 (p-value) | | | | | 0.005 | 0.005 | 0.008 | 0.008 | 0.005 | 0.065 |
| AR2 (p-value) | | | | | 0.559 | 0.613 | 0.157 | 0.284 | 0.108 | 0.681 |
| Observation | 765 | 765 | 765 | 765 | 739 | 739 | 510 | 510 | 510 | 510 |
| R-squared | 0.2722 | 0.3063 | 0.2297 | 0.2691 | | | | | | |
| No. of id | | | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 |

Source: Authors' calculations (2022). Notes: *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.