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# **Bank business models in MENA and African countries: the relevance of contextual variables**

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## ***Abstract***

Using a large sample of banks from the Middle East and North Africa (MENA) and African countries, we identify bank business models in the region. We use an Activity-Funding Approach (AFA) and cluster analysis, and we uncover a range of diverse business models heterogeneously distributed across countries. We then evaluate business model changes from 2010 to 2019, a turbulent time in many of our sample countries. We find a high persistence of bank business models. Finally, we consider the determinants of bank business models, including bank-specific and macroeconomic factors, and the internationalisation of banks in the region. We find that country-specific characteristics play a crucial role in influencing banks' choices. Regardless of the country of origin, foreign banks are more likely to diversify their assets and less likely to focus on lending than domestic banks.

## 1. Introduction

Bank business models are dynamic, and recent years have seen significant transformations in banks' organisational structures, business lines, and key markets. These developments have led to renewed interest in the analysis of banks' business models to foster a better understanding of the nature of banking risks and their contribution to systemic risk throughout the economic cycle (Cernov and Urbano, 2018; Ayadi *et al.*, 2020). Business models are influenced by many factors, both endogenous and exogenous. In terms of endogenous factors, the chosen business objectives of banks, for example, a focus on growth (asset growth, market share) or profitability (return on equity (ROE), return on assets (ROA)), influence the choice of the business model (Mergaerts and Vander Vennet, 2016; Roengpitya *et al.*, 2017). Exogenous factors include: (i) the structural evolution of banking sectors; (ii) changes in the competitive environment; (iii) the impact of technological advances; (iv) changes in the macro-economic environment in which banks and their customers operate; (v) the impact of domestic and international regulation; and (vi) degree of internationalisation of the domestic financial system. These changes have affected the evolution of the different business models with respect to bank size, capital-to-asset ratios and risk density (Roengpitya *et al.* 2017). They have also altered how banks respond to monetary policy and external shocks (Albertazzi and Gros, 2020). However, The effects of these changes on banks in emerging markets have been less investigated.

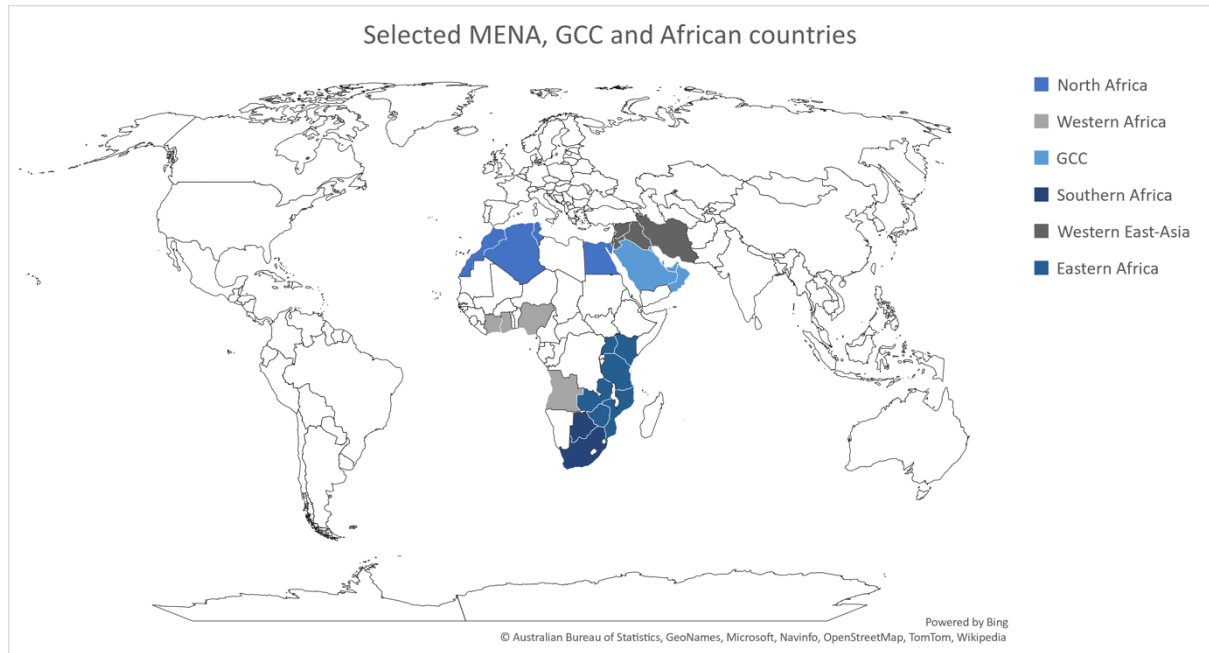
This paper focuses on the banking sector in the Middle East and North Africa (MENA) region, and selected African countries (see Figure 1).<sup>1</sup> Even though banks largely dominate the financial system in the region, the literature has paid relatively little attention to banking in Africa. The financial sector in these countries has undergone remarkable changes since the 1980s, and has faced all the significant challenges that a globalised financial system has imposed: privatisation, financial liberalisation, institutional and regulatory upgrades, digitalisation and the fintech revolution (Beck and Cull, 2019; EIB, 2020; Mutarindwa *et al.*, 2021). Most MENA and African countries have deep and stable financial systems; nonetheless, differences persist given these countries' diverse colonial and legal history. Countries also contend with different levels of economic and financial development, financial inclusion, creditors and property rights. In addition, political instability and, in some instances, corruption and poor governance, cause significant differences in financial stability and economic growth

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<sup>1</sup>According to the World Bank classification (2021), the Middle East & North Africa region includes: Algeria; Bahrain, Djibouti, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya; Malta, Morocco, Oman, Qatar; Saudi Arabia; Syria; Tunisia; the United Arab Emirates, West Bank and Gaza, Yemen. Our analysis excludes Malta as a member of the European Union and Djibouti, Libya and Yemen due to lack of data.

(Mutarindwa *et al.*, 2021; Arezki and Senbet, 2020). Such a diverse setting makes MENA and Africans' banking systems an excellent laboratory to conduct empirical research on the determinants of bank business model choices, considering both the microeconomic (or bank-level) and macro/institutional determinants of such managerial decisions.

**Figure 1: Selected MENA, GCCs and African Countries**



Note: The geographical areas are defined according to the UN geoscheme: a) Eastern Africa: Kenya, Mauritius, Mozambique, Tanzania, Uganda, Zambia, Zimbabwe; b) Gulf Cooperation Council (GCC): Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE; c) North Africa: Algeria, Egypt, Morocco, and Tunisia; d) Southern Africa: Botswana and South Africa; e) Western Africa: Angola, Ghana, Ivory Coast, and Nigeria; f) Western East-Asia: Iran, Iraq, Israel, Jordan, Lebanon, Palestina, and Syria.

Against this background, we aim to identify bank business models in the region and understand their main internal and external drivers. More specifically, our study addresses the following research questions: *i)* what are the main business models of banks in MENA and African countries? *ii)* what are the determinants of a bank's decision to adopt a specific business model?

To answer our research questions, we collected a large cross-country sample (584 banks from 30 countries) in the period following the global financial crisis (2010-2019). The starting point of our empirical analysis is the identification of bank business models using an *Activity-Funding Approach* (AFA) and cluster analysis. We identify both the traditional business models commonly found in the literature and some additional business models more specific

to countries in the region. These results extend the current literature by providing evidence on the variety of business models adopted by banks in the MENA region and Africa, beyond the typical distinction between Islamic banks and conventional banks (see, among others, Zarrouck *et al.*, 2016; Bitar *et al.*, 2018; Paltrinieri *et al.*, 2021). We then extend the analysis to investigate business model migrations. To do so, we track each bank over the sample period to assess whether it has changed its business model. We find that business models are highly persistent, although we identify some migrations, particularly towards more diversified and investment banking models.

Our large cross-country sample allows us to investigate endogenous (bank size, risk appetite, profitability, and growth of gross loans) and exogenous (macroeconomic and institutional characteristics of each sample country) drivers of the choice of a business model. We find that bank profitability and size are significant drivers. At the macro level, the structure of the financial system, including the credit to GDP ratio and the level of activity restrictions influence banks' organisational choices. When restrictions on banking activity are high, we find that banks are more likely to focus on retail banking. When financial development deepens, a varied banking system emerges, with more diversified business models and investment banking gaining importance. We find that private domestic banks tend to focus on retail activity, driven by lending. Banks belonging to foreign groups adopt similar business (wholesale or diversified) regardless of the country of origin of the parent bank. Finally, in countries with a more significant presence of Islamic banks or public banks – in terms of weight of total asset over GDP – banking institutions tend to be more focused on lending activities.

The contributions of our paper are manifold. First, we build on the literature on business model identification (Ayadi *et al.*, 2011; Ayadi and de Groen, 2014; Roengipitya *et al.*, 2014; Hryckiewicz and Kozłowski, 2017; Flori *et al.*, 2021) and present a detailed analysis of the business models of a large sample of MENA and African banks during an extended period. To the best of our knowledge, this is the first detailed study of bank business models for our sample countries. We also contribute to the literature on the internationalisation of banks and the growth of both domestic and international banks in the MENA and African regions (Pelletier, 2018). Finally, our study is related to the growing literature on the link between banks' business models and banks' characteristics, such as size, capitalization, risk, performance, operating efficiency, and ownership (Altunbas *et al.*, 2011; Ayadi *et al.*, 2014; Kohler, 2015; Mergaerts and Vander Vennet, 2016); and on the determinants of the chosen business models and its evolution (Roengipitya *et al.*, 2017; Ayadi *et al.* 2021).

The remainder of the paper is structured as follows. Section 2 illustrates the sample selection. Section 3 discusses the methodology employed for the identification of bank business models and shows the results of the cluster analysis. Section 4 discusses the empirical approach we follow to identify the determinants of business models' choice and presents the results of the analysis. Section 5 summarises our analysis and concludes.

## **2. Data and Sample**

The first step in our analysis is to construct the dataset. This step presents numerous challenges due to the large cross-country reach of our sample and the heterogeneity of the banking systems we aim to analyse. As a starting point, we consider the entire population of banks from the MENA region and selected African countries available in the SNL Unlimited database (S&P Global Market). Next, we apply some filters to the data, selecting information at the consolidated level for each sample country, thus obtaining an initial sample of 1,015 banks or banking groups. We then exclude central banks and holding companies that are not incorporated as "banks" and obtain a sample of 921 banks or banking groups observed from 2010 to 2019.<sup>2</sup> After checking for the availability of balance sheet data and financial information, we obtain a final sample composed of 584 banks from 30 MENA and African countries for a total of 4,027 bank year observations during the period 2010-2019. Table 1 reports the distribution of banks across countries and the average banking sector's total assets for each country.

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<sup>2</sup> There are no data available in the SNL Unlimited Database before 2010.

**Table 1 Sample description**

| Country              | N. obs.     | Number of banks | Banking sector Total asset<br>(euro, thousands)<br>Average 2010-2019 |
|----------------------|-------------|-----------------|----------------------------------------------------------------------|
| Algeria              | 229         | 16              | 6,138,681.00                                                         |
| Angola               | 100         | 19              | 3,222,526.03                                                         |
| Bahrain              | 182         | 26              | 5,826,733.95                                                         |
| Botswana             | 66          | 11              | 960,435.30                                                           |
| Egypt                | 88          | 33              | 6,586,289.10                                                         |
| Ghana                | 117         | 27              | 584,886.96                                                           |
| Iran                 | 271         | 18              | 18,165,299.37                                                        |
| Iraq                 | 156         | 14              | 879,783.90                                                           |
| Israel               | 104         | 14              | 32,686,206.74                                                        |
| Ivory Coast          | 79          | 15              | 834,821.12                                                           |
| Jordan               | 128         | 16              | 4,447,378.01                                                         |
| Kenya                | 139         | 39              | 875,446.62                                                           |
| Kuwait               | 275         | 13              | 20,010,570.73                                                        |
| Lebanon              | 94          | 36              | 6,051,676.67                                                         |
| Morocco              | 271         | 20              | 9,202,156.22                                                         |
| Mauritius            | 144         | 13              | 3,045,793.45                                                         |
| Mozambique           | 89          | 13              | 618,058.00                                                           |
| Nigeria              | 82          | 27              | 5,230,536.48                                                         |
| Oman                 | 136         | 10              | 6,326,979.77                                                         |
| Palestine            | 89          | 15              | 714,828.85                                                           |
| Qatar                | 123         | 14              | 29,295,176.44                                                        |
| Saudi Arabia         | 80          | 14              | 34,886,852.80                                                        |
| South Africa         | 121         | 9               | 30,921,459.00                                                        |
| Syria                | 126         | 14              | 777,452.80                                                           |
| Tanzania             | 163         | 33              | 374,344.25                                                           |
| Tunisia              | 204         | 24              | 1,399,366.22                                                         |
| Uganda               | 139         | 21              | 321,385.93                                                           |
| United Arab Emirates | 55          | 30              | 22,561,167.71                                                        |
| Zambia               | 76          | 12              | 480,806.11                                                           |
| Zimbabwe             | 101         | 17              | 438,034.98                                                           |
| <b>Total</b>         | <b>4027</b> | <b>584</b>      | <b>7,730,901.05</b>                                                  |

*Note: The table reports the distribution of bank-year observations, the number of banks per country and the average of the banking sector's total assets over 2010-2019.*

We categorise our sample countries according to the UN geoscheme and identify six macro-regions: a) Eastern Africa, including Kenya, Mauritius, Mozambique, Tanzania, Uganda, Zambia, Zimbabwe; b) Gulf Cooperation Council (GCC), including Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE; c) North Africa, including Algeria, Egypt, Morocco, and Tunisia; d) Southern Africa, including Botswana and South Africa; e) Western Africa, including Angola, Ghana, Ivory Coast, and Nigeria; f) Western East-Asia, including Iran, Iraq, Israel, Jordan, Lebanon, Palestine, and Syria. The descriptive statistics of macroeconomic variables for these areas are reported in Table 2. The statistics show that Western and Eastern African

**Table 2 Descriptive statistics of macroeconomic variables by macro-regions**

|                       | <b>EASTERN<br/>AFRICA</b> |        | <b>GCC</b> |        | <b>NORTH<br/>AFRICA</b> |       | <b>SOUTHERN<br/>AFRICA</b> |       | <b>WESTERN<br/>AFRICA</b> |       | <b>WESTERN<br/>ASIA</b> |       |       |
|-----------------------|---------------------------|--------|------------|--------|-------------------------|-------|----------------------------|-------|---------------------------|-------|-------------------------|-------|-------|
| Variable              | Obs                       | Mean   | Obs        | Mean   | Obs                     | Mean  | Obs                        | Mean  | Obs                       | Mean  | Obs                     | Mean  | ANOVA |
| LEVEL_OF_RESTRICTION* | 890                       | 2.602  | 566        | 1.214  | 307                     | 1.000 | 121                        | 2.545 | 480                       | 2.000 | 637                     | 2.356 | ***   |
| GDP_GROWTH            | 966                       | 0.057  | 795        | 0.033  | 695                     | 0.031 | 121                        | 0.031 | 480                       | 0.048 | 844                     | 0.029 | ***   |
| CREDIT_GDP*           | 865                       | 0.297  | 723        | 0.668  | 695                     | 0.516 | 121                        | 0.839 | 480                       | 0.170 | 835                     | 0.651 | ***   |
| FDI_NETINCOME*        | 966                       | 0.046  | 795        | 0.020  | 695                     | 0.020 | 121                        | 0.015 | 480                       | 0.023 | 844                     | 0.033 | ***   |
| TOTAL_ASSET_SYSTEM*   | 966                       | 35,400 | 795        | 43,700 | 695                     | 2,148 | 121                        | 1,974 | 480                       | 9,956 | 970                     | 44,68 | ***   |
| ISLAMIC_GDP*          | 890                       | 0.003  | 566        | 0.200  | 307                     | 0.019 | 121                        | 0.002 | 480                       | 0.003 | 637                     | 0.052 | ***   |
| FOREIGN_GDP*          | 890                       | 0.573  | 566        | 0.033  | 307                     | 0.250 | 121                        | 0.565 | 480                       | 0.265 | 637                     | 0.212 | ***   |
| GOVERNMENT_GDP*       | 890                       | 0.075  | 566        | 0.145  | 307                     | 0.297 | 121                        | 0.047 | 480                       | 0.124 | 637                     | 0.000 | ***   |
| Emerging_MNB          | 966                       | 0.030  | 795        | 0.030  | 695                     | 0.022 | 121                        | 0.033 | 480                       | 0.000 | 970                     | 0.145 | ***   |
| Global_MNB            | 966                       | 0.199  | 795        | 0.086  | 695                     | 0.367 | 121                        | 0.240 | 480                       | 0.188 | 970                     | 0.070 | ***   |
| Africa_MNB            | 966                       | 0.517  | 795        | 0.024  | 695                     | 0.252 | 121                        | 0.595 | 480                       | 0.525 | 970                     | 0.023 | ***   |

*Note: This table reports the average of key macroeconomic variables from 2010 to 2019. Eastern Africa: Kenya, Mauritius, Mozambique, Tanzania, Uganda, Zambia, Zimbabwe. GCC: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE. North Africa: Algeria, Egypt, Morocco; Tunisia. Southern Africa: Botswana and South Africa. Western Africa: Angola, Ghana, Ivory Coast and Nigeria. Western Asia: Iran, Iraq, Israel, Jordan, Lebanon, Palestina, and Syria. Variables: GDP\_GROWTH is the gdp growth in US Dollar; FDI\_NETINCOME is the foreign direct investment net income to gdp; N\_BANKS is the number of banks in each country; TOTAL\_ASSET\_BANKINGSYSTEM is the total asset in the banking system in each country; GOVERNMENT\_GDP is the total asset of banks owned by government; FOREIGN\_GDP is the total asset of banks owned by foreign banks; ISLAMIC\_GDP is the total asset of banks owned by islamic banks; CREDIT\_GDP is the credit to private over gdp; BANK\_RESTRICTION is a categorical variable from 1 to 4, it is equal 1 if country answers “A full range of these activities can be conducted directly in banks” to the question “What are the conditions under which banks can engage in securities activities (e.g., brokerage, dealing on own account, portfolio management, investment advice, underwriting, venture capital activities, securitization)?”, equal 2 if country answers “A full range of these activities are allowed but all or some of these activities must be conducted in subsidiaries, or in another part of a common holding”, equal 3 if the answer is “Less than the full range of activities can be conducted in banks, or subsidiaries, or in another part of a common holding company or parent” and equal 4 if answer is “None of these activities can be done in either banks or subsidiaries, or in another part of a common holding company or parent”. Higher the value, the stronger the activity restriction. Emerging MNB is a dummy variable that equals one if a bank is part of a group and the holding company is headquartered in an emerging country and zero otherwise. Global MNB is a dummy that equals one if a bank is part of a group and the holding company is headquartered in a developed country and zero otherwise. Africa MNB is a dummy variable that equals one if a bank is part of a group and the holding company is headquartered in an African country, and zero otherwise.*

\* Data from the Bank Regulation and Supervision Survey database (World Bank) are not available for Zambia, United Arab Emirates, Algeria, Egypt, Iran, Iraq, and Syria.

† Data from Financial Development Database (World Bank) are unavailable for Syria.

‡ Data from Financial Development Database (World Bank) are not available for Syria and Zimbabwe. For the other countries, the last data available is 2017.

countries have experienced the highest GDP growth during the sample period, while North African countries have had the lowest economic growth. Eastern Africa is also attracting the highest quota of foreign direct net investment to GDP. One of the specific features of these banking systems was the high government ownership; the total asset of banks owned by the government (GOVERNMENT\_GDP) diminished steadily since the 1980s, in favour of foreign banking assets and the increase of local private banking groups. Nonetheless, government ownership remains high, particularly in North Africa, where the government owns almost 30% of the total banking assets. In contrast, foreign banks' presence is dominant in Eastern Africa, with 57.3% of total banking assets owned by foreign banks. Islamic banks' presence is significant in GCC countries (19.8% of total assets owned), while in other areas, the share of Islamic banks' assets does not exceed 5% of total banking assets. The standard indicator of financial development ("Private credit to GDP") shows a wide variation among our sample macro-areas, with Eastern and Western Africa showing the lowest levels of 30% and 20%, respectively, compared to more than 60% in Western Asia or GCC. Regarding restrictions on bank activities, Eastern Africa still has a very stringent regulatory system. At the same time, North African banking sectors are more liberalised in terms of the activities banks are allowed to carry out. With regards to the size of the banking system, GCC and Western Asian countries have the largest banking system in terms of total assets, while North African countries have the smallest.

### **3. What are the main business models of banks in MENA and African countries?**

#### ***3.1 The identification of bank business models***

To identify the bank business models, we adopt the method proposed by Ayadi *et al.* (2020) based on cluster analysis. To cluster the observations, we adopt the hierarchical approach, using Ward's methodology that allows to measure the distance between clusters (Ward, 1963). In the choice of inputs for our cluster analysis, we follow an *Activity-Funding Approach*. Figure 2 illustrates the theoretical reference model and describes the procedure that all *Activity Funding Approaches* to business models identification share. When moving from a theoretical framework to an empirical application, it is often the case that researchers face data issues and rely on approximations of a broader framework. Specifically, in our case, we rely on

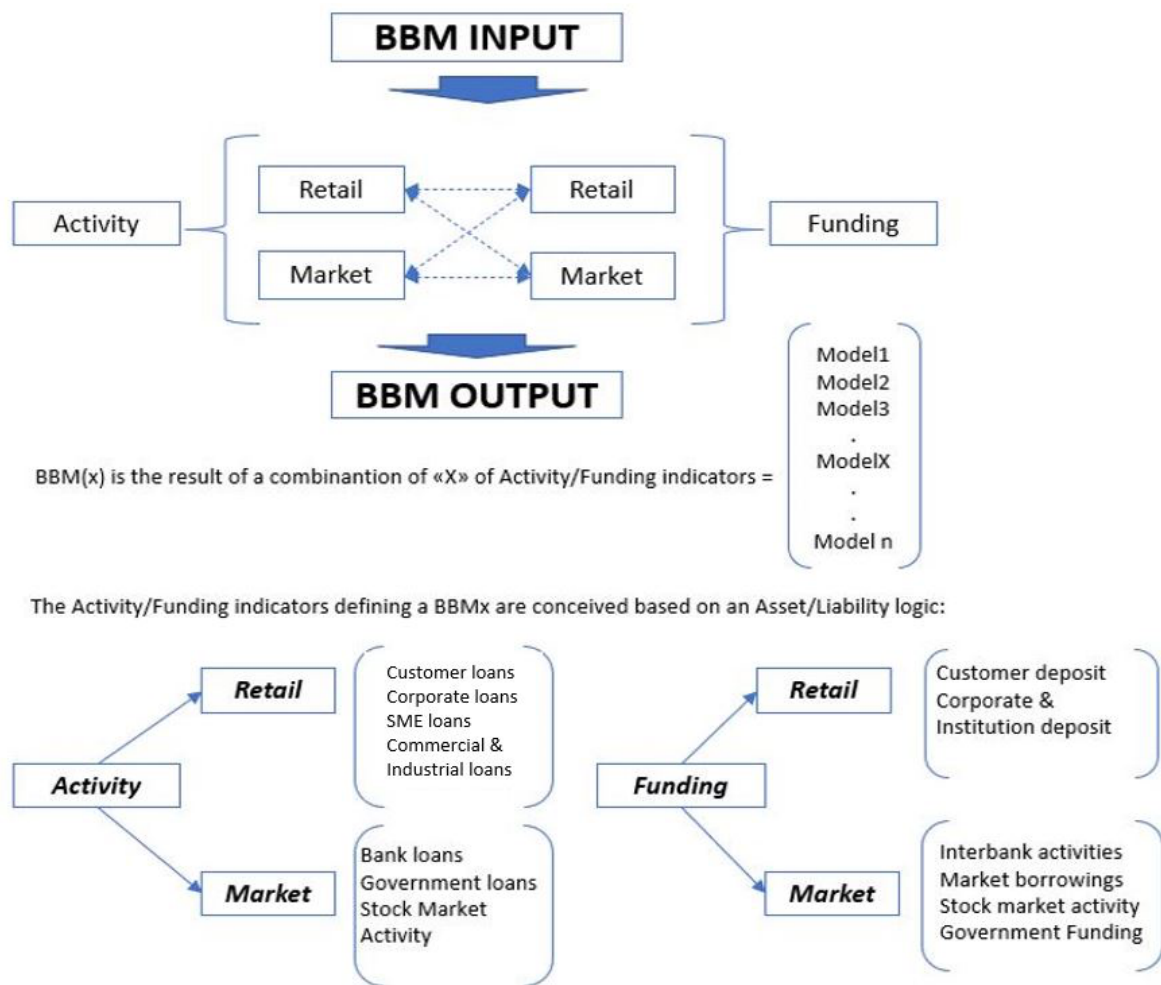
commercial databases for our balance sheet data. We also need to balance the cross-country comparability of our indicators with granularity. In addition, for banks in many of our sample countries, the balance sheet information is missing for particular items. In line with the literature, we use only macro-classes of assets and liabilities. It is important to note that the variables selected to identify business models are those designated by the cluster analysis. These are: 1) Loan to banks (% of total asset), 2) customer loans (% of total asset) 3) trading assets (% of total asset); 4) debt liability (% of total asset) and 5) derivatives (% of total asset).

The level of aggregation of balance sheet items used in our analysis mirrors the typical production process of a bank: deposit-taking, loan-granting and, if allowed by the regulation and implemented by the bank, an active role in the financial market. These balance sheet indicators align with longstanding research activity on bank business models (Ayadi et al. (2017, 2019)).

To identify the clusters, we adopt a hierarchical procedure, i.e., we start from the largest possible number of clusters, and merge clusters by minimizing the within-cluster sum-of-squared errors for any given number of clusters. To define the optimal number of clusters, we use the Calinski & Harabasz's (1974) pseudo-F index as the primary 'stopping rule'. The index is a sample estimate of the ratio of between-cluster variance to within-cluster variance. This approach leads to the identification of a different number of clusters in each country depending on the number of banks observed in specific countries and the characteristics of the country's banking system.

Unlike Ayadi *et al.* (2020), who analyse the European banking market, we run the cluster analysis country by country to capture the specificities of each country's banking sector,. Therefore, it is essential to identify bank business models at the country level. This choice is driven by the fact that MENA and African countries do not share a common regulatory approach for their national banking sectors, unlike in Europe, where a level playing field has been established by a common regulatory framework. Therefore, bank business models need to be defined considering each country individually.

**Figure 2 The Activity/Funding approach**



*Note: Figure describes the theoretical Asset/Liability approach commonly used to identify bank business models under the Activity-Funding Approach.*

### **3.2 Bank business models**

We compare the business models obtained for each national banking sector and identify nine common models, five of which are the traditional business models identified in the literature examining the European banking landscape (Roengipitya *et al.*, 2014; Farnè and Vouldis, 2017; Hryckiewicz and Kozłowski, 2017; Ayadi *et al.*, 2021). Specifically, we identify the following traditional business models, as illustrated in Figure 3:

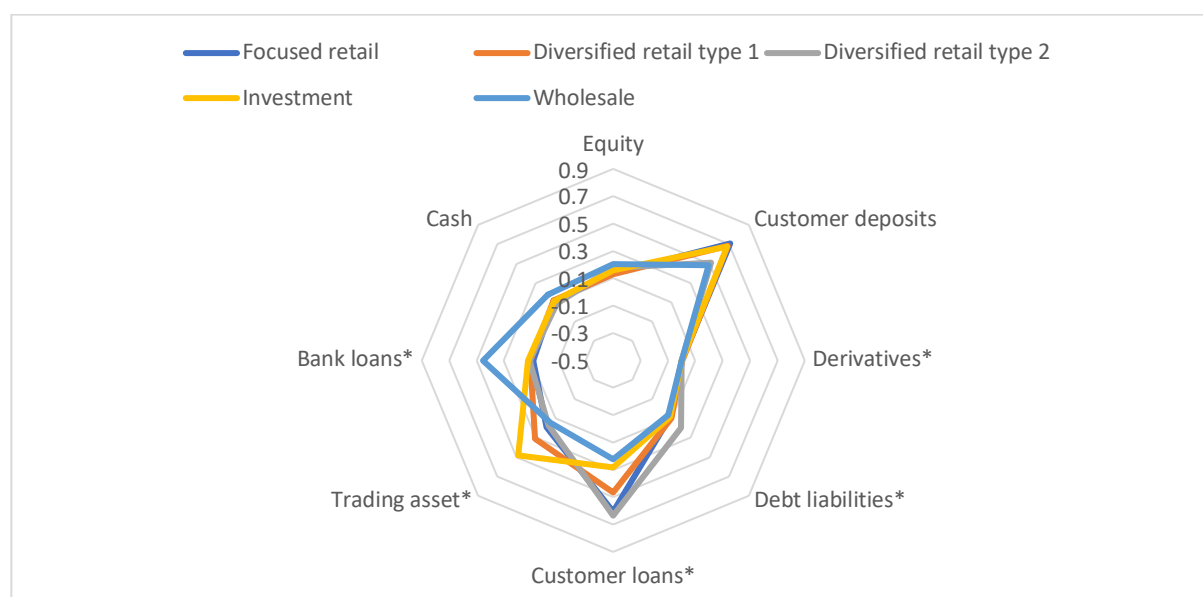
1. *Focused retail*: institutions that follow the traditional intermediation model: customer deposits are the primary source of funding, and customer loans are the main activity.

2. *Diversified retail (type 1)*: institutions similar to the abovementioned focused retail on the liability side (i.e., mainly funded by customer deposits). However, these banks are more diversified on the asset side, with a mix of customer loans and trading assets.
3. *Diversified retail (type 2)*: institutions similar to the abovementioned focused retail on the asset side (customer loans as their key activity), but more diversified on the liability side. These institutions still rely on customer deposits but also have access to other forms of funding.
4. *Wholesale*: institutions that focus on the interbank markets and are more wholesale oriented.
5. *Investment*: institutions that are more oriented to trading activities. This category includes universal banks with a significant investment banking division as well as pure investment banks.

Interestingly, we also identify four additional business models closely related to the focused retail and diversified business models, but with some unique characteristics representing some distinctive characteristics of our sample countries. More specifically, we identify the following additional business models, illustrated in Figure 4:

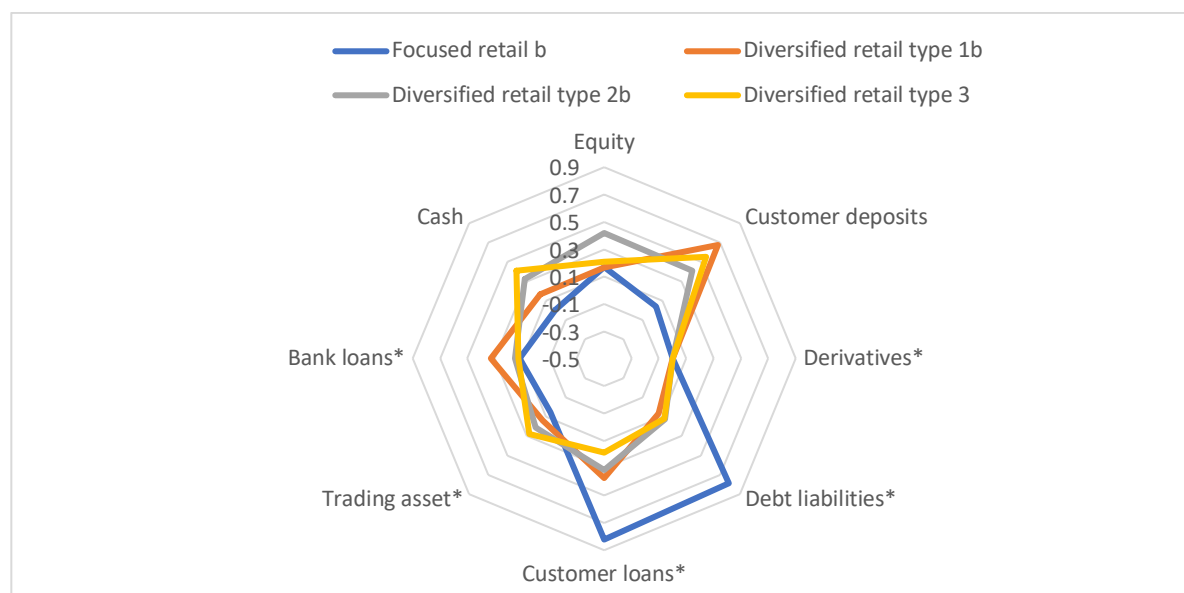
1. *Focused retail (type b)*: institutions with a similar asset side composition to focused retail business model described above. However, these institutions have a different liability composition, with debt liabilities rather than customer deposits, as their primary funding source.
2. *Diversified retail (type 1b)*: similar to institutions classified as diversified retail (type 1), these banks rely on customer deposits as their primary source of funding. On the asset side, they are more diversified, with a combination of customer loans and bank loans.
3. *Diversified retail (type 2b)*: similarly to the diversified retail (type 2), this business model encompasses more diversified institutions on the liability side. The characteristic that differentiates this business model is the relevance of the equity stake, together with customer deposits and other forms.
4. *Diversified retail (type 3)*: this business model is a novel output of our analysis. The distinguishing feature is the relevance of cash and trading assets associated with a high percentage of customer loans over total assets.

**Figure 3 Traditional bank business models**



*Note: Variables with asterisks are the variables selected in the cluster analysis. The other variables are included in the Figure to show a bank balance-sheet's traditional asset and liability composition. All variables are divided by the bank's total assets.*

**Figure 4 Additional bank business models**



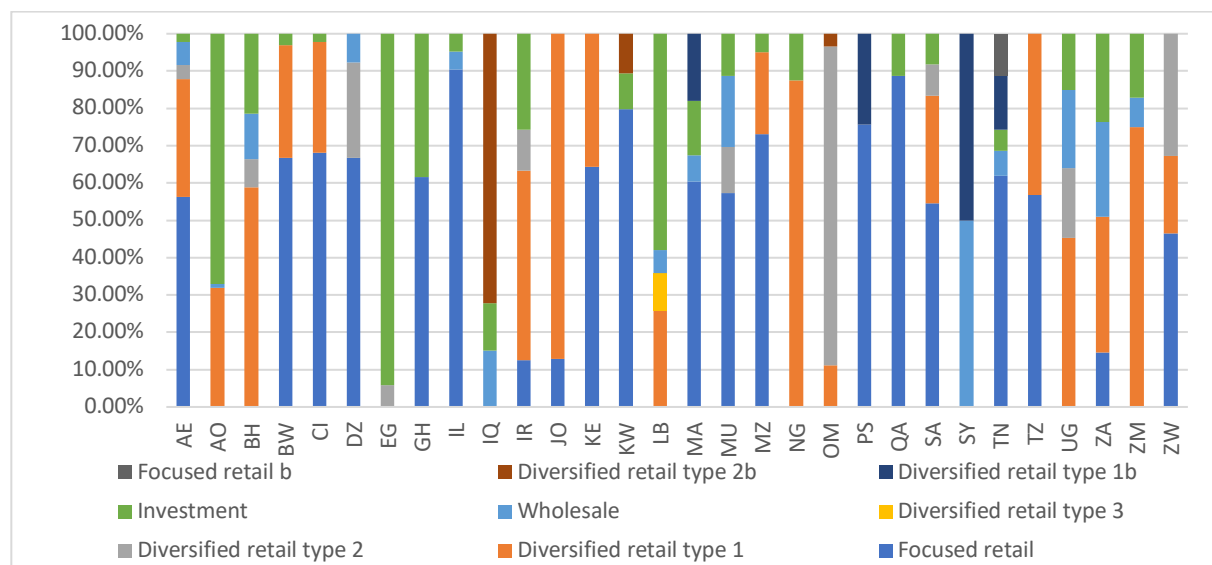
*Note: Variables with asterisks are the variables selected in the cluster analysis. The other variables are included in the Figure to show a bank balance-sheet's traditional asset and liability composition. All variables are divided by the bank's total assets.*

Although we identify more business models than in Europe, it is important to note that not all business models are present in each sample country. Looking at the distribution of business

models across countries, we observe that some – particularly the four additional ones – are found only in a few countries. As it can be seen in Figure 5, some countries have a less diversified banking system. For example, banks adopt only two business models among those identified in Iran, Jordan, Kenya, and Ghana. Other countries have a more heterogeneous banking sector, and banks adopt several different business models. The number of business models adopted in each country spans from a minimum of two to a maximum of five, as shown in Table A1 in the Appendix.

When considering the number of banks adopting one of the additional business modes, we identify only 62 out of our total sample of 584 banks. More specifically, we identify 31 banks that use the diversified retail (type 1b); 16 banks with the diversified retail (type 2b); 12 banks which adopt the diversified retail (type 3) and only 3 banks that use the focused retail (type b).

**Figure 5 Distribution of bank business models across countries**



*Note: The figure illustrates the different bank business models identified in each country.*

Table 3 reports the percentage distribution of bank business models over the six geographical areas. The most commonly adopted business models in the MENA region and our selected African countries are Focused Retail, Diversified Retail Type 1, and Investment. Investment banks are concentrated in Western and Northern Africa and Western Asia, while wholesale banks are more present in Southern Africa and Western Asia. Banks operating with a focused retail business mode exceed 40% in Eastern and Southern Africa and GCC countries. Considering the sum of the Focused Retail and Focused Retail b, this specific business model

exceeds 40% also in North African countries. The Diversified Retail Type 1 is present in all areas except for North Africa, where banks – although in a limited percentage – adopt the Diversified Retail Type 1b and Diversified Retail Type 2. The Diversified Retail Type 2b is adopted only by banks of GCC countries and Western Asia, where we also find that 2.78% of banks operate under the Diversified Retail Type 3 model. Western Asia seems to be the most diversified area regarding different business models adopted, while Western and Southern Africa are the least diversified.

**Table 3 Distribution of Bank Business Models by geographical area**

| BBMs                                | Eastern Africa | GCC         | North Africa | Southern Africa | Western Africa | Western Asia | All           |
|-------------------------------------|----------------|-------------|--------------|-----------------|----------------|--------------|---------------|
| <b>Focused retail</b>               | 46.69%         | 42.89%      | 38.27%       | 42.98%          | 32.50%         | 22.78%       | <b>36.93%</b> |
| <b>Focused retail (b)</b>           | -              | -           | 2.59%        | -               | -              | -            | <b>0.45%</b>  |
| <b>Diversified retail (type 1)</b>  | 35.71%         | 28.18%      | -            | 33.06%          | 36.88%         | 26.39%       | <b>25.88%</b> |
| <b>Diversified retail (type 1b)</b> | -              | -           | 7.19%        | -               | -              | 9.59%        | <b>3.55%</b>  |
| <b>Diversified retail (type 2)</b>  | 7.25%          | 13.71%      | 6.62%        | -               | -              | 1.44%        | <b>5.93%</b>  |
| <b>Diversified retail (type 2b)</b> | -              | 1.64%       | -            | -               | -              | 5.88%        | <b>1.74%</b>  |
| <b>Diversified retail (type 3)</b>  | -              | -           | -            | -               | -              | 2.78%        | <b>0.67%</b>  |
| <b>Wholesale</b>                    | 5.38%          | 4.53%       | 4.32%        | 11.57%          | 0.21%          | 10.00%       | <b>5.71%</b>  |
| <b>Investment</b>                   | 4.97%          | 9.06%       | 41.01%       | 12.40%          | 30.42%         | 21.13%       | <b>19.15%</b> |
| <b>All</b>                          | <b>100%</b>    | <b>100%</b> | <b>100%</b>  | <b>100%</b>     | <b>100%</b>    | <b>100%</b>  | <b>100%</b>   |

*Note: This table reports the percentage distribution of bank business models across geographical areas. Note: The geographical areas are defined according to the UN geoscheme: a) Eastern Africa: Kenya, Mauritius, Mozambique, Tanzania, Uganda, Zambia, Zimbabwe; b) Gulf Cooperation Council (GCC): Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE; c) North Africa: Algeria, Egypt, Morocco, and Tunisia; d) Southern Africa: Botswana and South Africa; e) Western Africa: Angola, Ghana, Ivory Coast, and Nigeria; f) Western East-Asia: Iran, Iraq, Israel, Jordan, Lebanon, Palestina, and Syria.*

Next, we categorise our sample countries according to the level of income. Following the World Bank definition, we allocate countries as follows:

1. *High Income*: Bahrain, Israel, Kuwait, Mauritius, Oman, Qatar, Saudi Arabia, United Arab Emirates
2. *Upper middle income*: Botswana, Iran, Iraq, Jordan, Lebanon, South Africa
3. *Lower middle income*: Algeria, Angola, Egypt, Ghana, Ivory Coast, Kenya, Morocco, Nigeria, Palestina, Tanzania, Tunisia, Zambia, Zimbabwe
4. *Low Income*: Mozambique, Syria and Uganda

Many low-income countries, particularly in sub-Saharan Africa, continue to be financially underdeveloped. The structure of their banking sectors, and banks' business model choices, might contribute to or be driven by average income levels, which influences the demand for banking services. Table 4 reports the distribution of bank business models according to income level area. The most common bank business models in high-income countries are the focused retail and the diversified retail (type 1). Interestingly, in low-income countries, we observe a greater diversification of business models. Finally, in middle-income countries (upper middle and lower middle), the focused retail and the diversified retail (type 1) are the most common bank business models.

**Table 4 Distribution of Bank Business Models by income level**

|                                     | High income | Low income | Lower middle income | Upper middle income | All           |
|-------------------------------------|-------------|------------|---------------------|---------------------|---------------|
| <b>Focused retail</b>               | 49.19%      | 17.29%     | 43.76%              | 11.65%              | <b>36.93%</b> |
| <b>Focused retail (b)</b>           | -           | -          | 0.92%               | -                   | <b>0.45%</b>  |
| <b>Diversified retail (type 1)</b>  | 22.67%      | 23.34%     | 22.57%              | 40.11%              | <b>25.88%</b> |
| <b>Diversified retail (type 1b)</b> | -           | 18.16%     | 4.09%               | -                   | <b>3.55%</b>  |
| <b>Diversified retail (type 2)</b>  | 12.15%      | 7.49%      | 4.04%               | 1.90%               | <b>5.93%</b>  |
| <b>Diversified retail (type 2b)</b> | 1.32%       | -          | -                   | 7.72%               | <b>1.74%</b>  |
| <b>Diversified retail (type 3)</b>  | -           | -          | -                   | 3.66%               | <b>0.67%</b>  |
| <b>Wholesale</b>                    | 5.87%       | 26.51%     | 1.89%               | 5.83%               | <b>5.71%</b>  |
| <b>Investment</b>                   | 8.81%       | 7.20%      | 22.72%              | 29.13%              | <b>19.15%</b> |
| <b>All</b>                          | 100.00%     | 100.00%    | 100.00%             | 100.00%             | 100.00%       |

Note: High Income: Bahrain, Israel, Kuwait, Mauritius, Oman, Qatar, Saudi Arabia, United Arab Emirates; Low Income: Mozambique, Syria and Uganda; Lower middle income: Algeria, Angola, Egypt, Ghana, Ivory Coast, Kenya, Morocco, Nigeria, Palestina, Tanzania, Tunisia, Zambia, Zimbabwe; Upper middle income: Botswana, Iran, Iraq Jordan, Lebanon, South Africa.

### **3.3 Bank business model migrations**

Although it is common in the literature to consider business models as static, recent studies have focused on their evolution (Roengpitya *et al.*, 2017; Ayadi *et al.*, 2021). Given the length of our sample period and the regulatory and technological changes that impacted the financial sector in most countries, we track each bank over time and assess whether it changed its business model. The results of this part of the analysis are shown in Table 5.

Looking at the total migrations, based on 3,443 bank-year observations covering 584 banks, we observe 327 migrations and 197 banks that move at least once. Therefore, migrating banks, on average, move 1.65 times. Although most banks remain in their initial business models, a

group of banks migrate and changed their business model more than once during the last ten years.

**Table 5 Bank business model migrations during the period investigated**

| <b>Year</b> | <b>Non migrating banks</b> | <b>Migrating banks</b> | <b>All</b>  |
|-------------|----------------------------|------------------------|-------------|
| 2011        | 304                        | 29                     | 333         |
| 2012        | 350                        | 27                     | 377         |
| 2013        | 375                        | 35                     | 410         |
| 2014        | 389                        | 29                     | 418         |
| 2015        | 386                        | 50                     | 436         |
| 2016        | 397                        | 48                     | 445         |
| 2017        | 386                        | 49                     | 435         |
| 2018        | 393                        | 42                     | 435         |
| 2019        | 136                        | 18                     | 154         |
| <b>All</b>  | <b>3116</b>                | <b>327</b>             | <b>3443</b> |

Table 6 shows the distribution of migrations among different business models over the sample period; it highlights which business models are stable and which ones are either gaining or losing in terms of total assets. The diagonal line (in grey) shows the percentage of bank total assets o that do not migrate.

We find a high persistence of bank business models in our sample countries: the percentage of banks that do not change their business models is higher than 91%. The only exceptions are banks adopting a diversified retail (type 3) business model; in this category, almost 34% moved to the diversified retail (type 1) and 62.49% to the investment business model.<sup>3</sup>

Banks adopting either of the two focused retail models or the diversified retail (type 2) and (type 2b) models show the highest persistence: 95.53%, 96.68%, 94.72% and 94.00% of the banks, respectively, maintained their initial business model. Most of the diversified retail (type 1) and (type 1b), wholesale and investment banks also remained within the same model throughout the sample period (93.64%, 83.97%, 91.75%, and 93.64%%, respectively). Considering the inflows and outflows from one business model to another, focused retail, diversified retail (type 1), wholesale and investment business models are net acquirers. By contrast, all other models lose more banks than they receive.

<sup>3</sup> It is important to remember that only 12 banks adopt the diversified retail (type 3) business model during the period observed.

**Table 7 Bank business models migrations matrix**

| BM<br>(t-1↓) (t→)             | Focused<br>retail | Focused<br>retail b | Diversified<br>retail type<br>1 | Diversified<br>retail type<br>1b | Diversified<br>retail type<br>2 | Diversified<br>retail type<br>2b | Diversified<br>retail type<br>3 | Wholesale | Investment |
|-------------------------------|-------------------|---------------------|---------------------------------|----------------------------------|---------------------------------|----------------------------------|---------------------------------|-----------|------------|
| Focused retail                | 95.53%            | 0.00%               | 4.05%                           | 0.01%                            | 0.29%                           | 0.00%                            | 0.00%                           | 0.02%     | 0.09%      |
| Focused retail b              | 3.32%             | 96.68%              | 0.00%                           | 0.00%                            | 0.00%                           | 0.00%                            | 0.00%                           | 0.00%     | 0.00%      |
| Diversified retail<br>type 1  | 2.87%             | 0.00%               | 93.64%                          | 0.00%                            | 0.02%                           | 0.00%                            | 1.23%                           | 0.03%     | 2.22%      |
| Diversified retail<br>type 1b | 3.89%             | 0.00%               | 0.00%                           | 83.97%                           | 0.00%                           | 0.00%                            | 0.00%                           | 11.56%    | 0.58%      |
| Diversified retail<br>type 2  | 4.77%             | 0.00%               | 0.42%                           | 0.00%                            | 94.72%                          | 0.00%                            | 0.00%                           | 0.00%     | 0.08%      |
| Diversified retail<br>type 2b | 1.05%             | 0.00%               | 0.00%                           | 0.00%                            | 2.49%                           | 94.00%                           | 0.00%                           | 1.69%     | 0.78%      |
| Diversified retail<br>type 3  | 0.00%             | 0.00%               | 34.16%                          | 0.00%                            | 0.00%                           | 0.00%                            | 3.35%                           | 0.00%     | 62.49%     |
| Wholesale                     | 3.38%             | 0.00%               | 2.20%                           | 1.56%                            | 0.00%                           | 0.49%                            | 0.00%                           | 91.75%    | 0.62%      |
| Investment                    | 0.46%             | 0.00%               | 5.28%                           | 0.00%                            | 0.00%                           | 0.00%                            | 0.59%                           | 0.03%     | 93.64%     |

This table reports the distribution of migrations among different business models during the whole period investigated (2010 – 2019) in terms of total assets (%). The diagonal line (in grey) shows the percentage of total assets of banks that do not migrate.

#### 4. What are the determinants of a bank's decision to adopt a specific business model?

##### 4.1 Empirical approach

To answer our research question related to the determinants of the choice of business model, we run a multinomial logistic regression with robust standard errors. We opt for this model since our dependent variable is categorical, assuming five different unordered values (from 1 to 5). We consider only those banks that fit into the following five BMs: a) focused retail; b) diversified retail type 1; c) diversified retail type 2; d) wholesale; and e) investment. Due to the limited number of banks that adopt the four additional BMs identified in some MENA and African countries, we prefer to exclude them from this part of the analysis, focusing only on the most commonly adopted ones.

Although the dependent variable is coded as: 1, 2, 3, 4, and 5; these numerical values are not implying that outcome 1 (focused retail) is lower than outcomes 2 or 3 (diversified retail BMs) that, in turn, are not lower than outcome 4 (wholesale BM) or 5 (investment BM). Multinomial logistic fits maximum likelihood models with discrete dependent (left-hand-side) variables when the dependent variable takes on more than two outcomes and the outcomes have no natural ordering. This regression model allows us to compare the probability of adopting a specific business model and simultaneously compare each group to a base group. In addition, we measure margins because the multinomial logit coefficients can only be interpreted in terms

of relative probabilities, and it is necessary to calculate marginal effects to reach a conclusion about actual probabilities.

The regression model is structured as follows:

$$Y_{i,t} = \alpha_i + \sum_i^n \beta_i X_{i,t-1} + \sum_i^n \gamma_i Z_{i,t-1} + \sum_i^n \delta_i W_{i,t-1} + \varepsilon_i \quad (1)$$

where  $Y$  is the categorical variable which assumes values from 1 to 5 depending on the business model adopted by bank  $i$  at time  $t$ . Our set of explanatory variables include a vector of bank-specific variables ( $X_{i,t-1}$ ), a vector of macroeconomic characteristics of each sample country ( $Z_{i,t-1}$ ) and a vector of institutional features of its banking system ( $W_{i,t-1}$ ).

Among bank characteristics, we include: a) the return on equity as a measure of banks' profitability (ROE); b) the ratio of non-performing loans over total assets, as a measure of credit portfolio quality (NPL\_TA); c) the ratio of risk-weighted assets over total assets as a proxy for bank risk appetite (RWA\_TA); and d) the growth of gross loans as a measure of bank lending activity (GROWTH\_GL).<sup>4</sup>

In the vector of macroeconomic characteristics, we include: a) the level of regulatory restrictions that assumes values from 1 to 4 - the higher the value, the higher the level of bank activity restrictions; b) the growth of gross domestic product (GDP\_GROWTH) as a measure of economic growth; c) the ratio of domestic credit to the private sector over GDP, as a proxy for the level of each country financial development; d) the ratio of net flows of foreign direct investment over GDP (FDI\_NETINFLOW), as a proxy of the country capability to attract foreign capital, and the openness of the economy; e) the value of the financial system total assets over GDP as a measure of the size of the financial system (TOTAL\_ASSET\_SYSTEM).

The next set of variables aims to capture some of the banking sector characteristics in our sample countries. Some of these countries are characterised by a high degree of government intervention in the banking sector. Others have a large share of Islamic banking assets. Finally, as in most emerging markets, a substantial share of the banking sector is foreign-owned. Foreign ownership can be characterised by African banking groups, banking groups from other emerging markets, and European and other developed countries banking groups. To capture the

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<sup>4</sup> We select the variables considering the correlations among the bank characteristics and the macroeconomic variables. Due to the high correlation between the bank size and some macroeconomic variables, we decided to not include the bank size among the bank characteristics in the regression model.

importance of Islamic banking, foreign banking and state-owned banking we include: a) the ratio of total banking assets owned by Islamic banks over GDP (ISLAMIC\_TA); b) the ratio of total banking assets owned by Foreign banks over GDP (FOREIGN\_TA); and c) the ratio of total banking assets owned by the Government over GDP (GOVERNMENT\_TA). Finally, to control for the region of origin of foreign banks, we include three dummy variables that capture the membership of the sample bank of an international banking group. The first dummy takes the value 1 if the bank is owned by a holding institution headquartered in an emerging country other than African countries (Emerging\_MNB). The second dummy takes the value 1 if the bank is owned by a holding institution headquartered in a developed country (Global\_MNB). Finally, the third dummy takes the value 1 if the bank is owned by a holding institution headquartered in an African country (African\_MNB). All variables – except the dummy variables – are included at time t-1. Table A2 in the Appendix reports a detailed description of the variables included in the analysis.

#### ***4.2 The choice of business model***

Table 8 reports the results of the regression model. Specifically, it shows the margins of the multinomial logit regression rather than the coefficients since they allow us to determine the effect of each independent variable in the probability scale. Each margin represents the probability that a bank adopts that specific business model, given a 1% increase in the explanatory variable.

Our results indicate that banks with higher profitability are more likely to be less diversified and adopt a more specialised business model (i.e. focused retail or investment business model). Banks with greater risk appetite, lower-quality credit portfolios and higher loan growth are more likely to choose the focused retail model. Instead, banks with a lower than average loan growth and a lower risk appetite tend to adopt the diversified retail (type 1) model.

**Table 8: Determinant of BM choice – multinomial logit results**

|                      | FOCUSED                  | DIV.TYPE1                | DIV.TYPE2                | WHOLESALE                | INVESTMENT               |
|----------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|                      | dy/dx                    | dy/dx                    | dy/dx                    | dy/dx                    | dy/dx                    |
| ROE                  | 0.337***<br><i>0.07</i>  | -0.236**<br><i>0.09</i>  | -0.044<br><i>0.03</i>    | -0.133**<br><i>0.05</i>  | 0.077*<br><i>0.03</i>    |
| NPL_TA               | 1.073***<br><i>0.34</i>  | 0.639<br><i>0.44</i>     | -0.063<br><i>0.18</i>    | -1.143***<br><i>0.34</i> | -0.506<br><i>0.51</i>    |
| RWA_TA               | 0.137*<br><i>0.06</i>    | -0.334***<br><i>0.06</i> | 0.196***<br><i>0.04</i>  | -0.017<br><i>0.03</i>    | 0.018<br><i>0.07</i>     |
| GROWTH_GL            | 0.123***<br><i>0.04</i>  | -0.144**<br><i>0.05</i>  | -0.003<br><i>0.01</i>    | -0.013<br><i>0.02</i>    | 0.038<br><i>0.04</i>     |
| LEVEL_OF_RESTRICTION | 0.197***<br><i>0.02</i>  | 0.013<br><i>0.02</i>     | -0.107***<br><i>0.01</i> | -0.033***<br><i>0.01</i> | -0.070***<br><i>0.01</i> |
| GDP_GROWTH           | 0.392<br><i>0.59</i>     | 0.200<br><i>0.63</i>     | 0.036<br><i>0.17</i>     | -0.448*<br><i>0.24</i>   | -0.179<br><i>0.55</i>    |
| CREDIT_GDP           | -0.244*<br><i>0.10</i>   | 0.355***<br><i>0.10</i>  | -0.607***<br><i>0.12</i> | 0.051<br><i>0.05</i>     | 0.445***<br><i>0.06</i>  |
| FDI_NETINFLOW        | 2.324***<br><i>0.37</i>  | -0.694<br><i>0.49</i>    | -0.609***<br><i>0.21</i> | -0.727***<br><i>0.21</i> | -0.294<br><i>0.25</i>    |
| TOTAL_ASSET_SYSTEM   | 0.002<br><i>0.00</i>     | -0.008*<br><i>0.00</i>   | -0.002<br><i>0.00</i>    | 0.005***<br><i>0.00</i>  | 0.003<br><i>0.00</i>     |
| ISLAMIC_TA           | 1.317***<br><i>0.19</i>  | 0.272<br><i>0.17</i>     | -0.259***<br><i>0.04</i> | -0.227*<br><i>0.08</i>   | -1.102***<br><i>0.20</i> |
| FOREIGN_TA           | -0.091<br><i>0.07</i>    | -0.255***<br><i>0.08</i> | 0.121***<br><i>0.03</i>  | 0.147***<br><i>0.03</i>  | 0.077<br><i>0.05</i>     |
| GOVERNMENT_TA        | 0.996***<br><i>0.18</i>  | -0.792***<br><i>0.22</i> | 0.095<br><i>0.11</i>     | -0.219*<br><i>0.10</i>   | -0.080<br><i>0.14</i>    |
| Emerging_MNB         | -2.356***<br><i>0.10</i> | 2.440***<br><i>0.10</i>  | 0.391***<br><i>0.05</i>  | 0.360***<br><i>0.05</i>  | -0.835***<br><i>0.06</i> |
| Global_MNB           | -0.239***<br><i>0.04</i> | 0.256***<br><i>0.03</i>  | -0.090***<br><i>0.02</i> | 0.039*<br><i>0.01</i>    | 0.034<br><i>0.02</i>     |
| Africa_MNB           | -0.051*<br><i>0.02</i>   | 0.058*<br><i>0.03</i>    | -0.033*<br><i>0.01</i>   | 0.014<br><i>0.02</i>     | 0.013<br><i>0.02</i>     |
| OBS                  | 1,171                    |                          |                          |                          |                          |
| R2                   | 0.2774                   |                          |                          |                          |                          |

*Note: This table reports the margins of the multinomial logit regressions. The dependent variable is a categorical variable ranging from 1 to 5. The independent variables are: ROE is the return on equity; SIZE is the natural logarithm of total assets; NPL\_TA is the non-performing loans over total asset ratio; RWA\_TA is the risk-weighted asset density; GROWTH\_GL is the growth of gross loans year on year; LEVEL\_OF\_RESTRICTION is a categorical variable ranging from 0 to 4, that measures the restriction of bank activity at the country level; GDP\_GROWTH is the growth of gross domestic product year on year; CREDIT\_GDP is the domestic credit to the private sector over GDP; FDI\_NETINFLOW is the foreign direct net investments over GDP; TOTAL\_ASSET\_SYSTEM is the natural logarithm of the total assets of the banking system at country level; ISLAMIC\_TA is the total assets owned by Islamic banks over GDP; FOREIGN\_TA is the total assets owned by foreign banks over GDP; GOVERNMENT\_TA is the total bank assets owned by the government over GDP. Emerging\_MNB is a dummy variable equal to 1 if a bank is owned by a holding company headquartered in an emerging country (not an African country) and zero otherwise. Global\_MNB is a dummy variable equal to 1 if a bank is owned by a holding company headquartered in a developed country and zero otherwise. African\_MNB is a dummy variable equal to 1 if a bank is owned by a holding company headquartered in an African country, zero otherwise. \*, \*\*, \*\*\* mean p-value < 0.05, < 0.01, < 0.001 respectively, Standard errors are reported in italics.*

We also find that when the banking sector increases in size, there is a higher probability that the wholesale business model is adopted and a lower probability of banks adopting more diversified models. When the proportion of Islamic banks' total assets over GDP is higher, there is a higher probability that the focused retail model is adopted and a lower probability of banks choosing the diversified retail type 2, wholesale, and investment. This result aligns with Paltrinieri et al. (2021), who underline that diversification provides lower rewards for Islamic banks than conventional banks. We find opposite results when the weight of foreign banks' total assets over GDP is higher; in this case, banks are more likely to adopt the Diversified Retail type 2 and Wholesale models. When government ownership is important, banks are more likely to adopt those business models more oriented to retail activities.

As for the location of the holding company of our sample banks, we do not find divergent patterns in the choice of the business models of non-domestic banks. Banks owned by a holding company headquartered in an emerging country are more likely to be diversified or wholesale banks. A similar result characterises banks belonging to groups headquartered in developed countries (Global\_MNB) and banks owned by a holding company headquartered in another African country. In sum, non-domestic banks are more likely to diversify their assets and less likely to focus on lending activities than domestic banks. This result suggests that domestic banks are more retail-oriented and focus on traditional intermediation activities, predominantly adopting the Focused Retail or the Diversified Retail type 1 business models.

## **5. Robustness checks**

Banks occasionally change their business model, and they do so for different reasons. For example, to respond to market forces and competitive pressures. They also change their business model to respond to strategic drivers, such as reducing costs, improving efficiency, and curbing excessive risk-taking activities. Finally, business models' migrations might be a bank's response to regulatory and government-led decisions. While the decision to change the business model is crucial for any organisation, and it is common to identify some stickiness or persistence, it is important to allow for changes. Nonetheless, to ensure that migrating banks do not drive our results, we re-run our baseline multinomial logit regression on a subsample of banks that do not change their business model during the period investigated. The results of this analysis are reported in Table 9, and they are in line with our main findings, both with regard to bank-specific characteristics and macroeconomic variables, therefore indicating business model migrations are not biasing our results.

**Table 9 Determinant of BM choice of stable banks – multinomial logit results**

|                      | FOCUSED                   | DIV.TYPE1                 | DIV.TYPE2                 | WHOLESALE                 | INVESTMENT                |
|----------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
|                      | dy/dx                     | dy/dx                     | dy/dx                     | dy/dx                     | dy/dx                     |
| ROE                  | 0.375***<br><i>0.112</i>  | -0.004*<br><i>0.026</i>   | -0.196***<br><i>0.051</i> | -0.205***<br><i>0.054</i> | 0.381***<br><i>0.089</i>  |
| NPL_TA               | 0.905*<br><i>0.412</i>    | 2.396***<br><i>0.509</i>  | -0.092<br><i>0.167</i>    | -0.289*<br><i>0.169</i>   | -3.683***<br><i>0.730</i> |
| RWA_TA               | 0.247***<br><i>0.068</i>  | -0.567***<br><i>0.075</i> | 0.144***<br><i>0.037</i>  | 0.059<br><i>0.027</i>     | -0.116<br><i>0.057</i>    |
| GROWTH_GL            | 0.067*<br><i>0.018</i>    | -0.100<br><i>0.064</i>    | 0.023<br><i>0.011</i>     | -0.034*<br><i>0.049</i>   | -0.043<br><i>0.024</i>    |
| LEVEL_OF_RESTRICTION | 0.235***<br><i>0.026</i>  | 0.011<br><i>0.026</i>     | -0.128***<br><i>0.022</i> | 0.020<br><i>0.025</i>     | -0.138***<br><i>0.018</i> |
| GDP_GROWTH           | 0.025<br><i>0.656</i>     | 1.333<br><i>0.864</i>     | -0.075<br><i>0.226</i>    | -0.760*<br><i>0.012</i>   | -0.522<br><i>0.819</i>    |
| CREDIT_GDP           | 0.076<br><i>0.148</i>     | 0.452***<br><i>0.128</i>  | -0.884***<br><i>0.148</i> | 0.046<br><i>0.038</i>     | 0.309***<br><i>0.045</i>  |
| FDI_NETINFLOW        | 3.199***<br><i>0.541</i>  | -2.73***<br><i>0.683</i>  | -0.478*<br><i>0.238</i>   | 0.257<br><i>0.225</i>     | -0.244<br><i>0.355</i>    |
| TOTAL_ASSET_SYSTEM   | 0.029<br><i>0.006</i>     | -0.019**<br><i>0.007</i>  | 0.004<br><i>0.002</i>     | 0.011***<br><i>0.004</i>  | 0.034***<br><i>0.006</i>  |
| ISLAMIC_TA           | 2.439***<br><i>0.263</i>  | 1.679<br><i>0.364</i>     | -0.344**<br><i>0.117</i>  | -0.187*<br><i>0.289</i>   | -3.586***<br><i>0.470</i> |
| FOREIGN_TA           | -0.374***<br><i>0.124</i> | 0.157*<br><i>0.047</i>    | 0.107*<br><i>0.064</i>    | 0.201*<br><i>0.087</i>    | 0.437***<br><i>0.098</i>  |
| GOVERNMENT_TA        | 1.063**<br><i>0.470</i>   | -2.497*<br><i>1.045</i>   | 0.231*<br><i>0.115</i>    | -4.728*<br><i>1.837</i>   | 0.939<br><i>0.352</i>     |
| Emerging_MNB         | -0.586***<br><i>0.120</i> | 0.384***<br><i>0.094</i>  | 0.904***<br><i>0.151</i>  | 0.040*<br><i>0.044</i>    | -0.026**<br><i>0.013</i>  |
| Global_MNB           | -0.193*<br><i>0.089</i>   | 0.542***<br><i>0.061</i>  | -0.763***<br><i>0.111</i> | 0.101***<br><i>0.019</i>  | 0.073<br><i>0.041</i>     |
| Africa_MNB           | -0.067*<br><i>0.042</i>   | 0.066*<br><i>0.041</i>    | -0.059*<br><i>0.032</i>   | 0.051**<br><i>0.018</i>   | 0.009<br><i>0.019</i>     |
| OBS                  | 777                       |                           |                           |                           |                           |
| R2                   | 0.474                     |                           |                           |                           |                           |

*Note: This table reports the margins of the multinomial logit regressions on the subsample of banks that do not change their business model. The dependent variable is a categorical variable ranging from 1 to 5. The independent variables are: ROE is the return on equity; SIZE is the natural logarithm of total assets; NPL\_TA is the non-performing loans over total asset ratio; RWA\_TA is the risk-weighted asset density; GROWTH\_GL is the growth of gross loans year on year; LEVEL\_OF\_RESTRICTION is a categorical variable ranging from 0 to 4, that measures the restriction of bank activity at the country level; GDP\_GROWTH is the growth of gross domestic product year on year; CREDIT\_GDP is the domestic credit to the private sector over GDP; FDI\_NETINFLOW is the foreign direct net investments over GDP; TOTAL\_ASSET\_SYSTEM is the natural logarithm of the total assets of the banking system at country level; ISLAMIC\_TA is the total assets owned by Islamic banks over GDP; FOREIGN\_TA is the total assets owned by foreign banks over GDP; GOVERNMENT\_TA is the total bank assets owned by the government over GDP. Emerging\_MNB is a dummy variable equal to 1 if a bank is owned by a holding company headquartered in an emerging country (not an African country) and zero otherwise. Global\_MNB is a dummy variable equal to 1 if a bank is owned by a holding company headquartered in a developed country and zero otherwise. African\_MNB is a dummy variable equal to 1 if a bank is owned by a holding company headquartered in an African country, zero otherwise. \*, \*\*, \*\*\* mean p-value < 0.05, < 0.01, < 0.001 respectively, Standard errors are reported in italics.*

## 5. Conclusions

This study evaluates bank business models in MENA and African countries, using the Activity-Funding Approach (AFA) and cluster analysis. Because of the significant differences between the countries included in the analysis, we identify the business models at the country level. We uncover nine distinct bank business models, substantially more than the four or five commonly found in the literature. Nonetheless, the most widely adopted business models are similar to those identified by Ayadi et al. (2021) for European banks. The additional business models reflect unusual forms of diversification, both on the asset and liability side of the balance sheet. These additional models are observed only in one or a few countries. We find a high persistence in the business models adopted by banks in our sample countries over our sample period (2010 - 2019). Given that the re-evaluation of existing business models in a fast-changing regulatory and technological environment is key to remaining profitable, questions emerge on the pace of change in our sample countries.

Next, we investigate endogenous and exogenous characteristics that may influence the decision to adopt a particular business model. We consider both bank-specific factors and macroeconomic variables that describe the economic and financial structure of the countries investigated. The inclusion of variables at the country level allows us to reduce the heterogeneity of our sample and, in particular, to examine the relevance of the macroeconomic context in the diffusion of specific models.

Our results suggest that the country's macroeconomic context matters in deciding to adopt a business model. Banks are more likely to opt for more or less diversified business models depending on their specific characteristics and the context in which they work. When restrictions on banking activity are high, banks are more likely to focus on retail banking. The opposite happens when financial development deepens, a varied banking system emerges, with more diversified business models and investment banking gaining importance. Banks favour less diversified business models in countries with a large share of Islamic and government-owned banking assets. The opposite is true in countries with large shares of foreign-owned banking assets. Regardless of the country of origin, foreign banks are more likely to diversify their assets and less likely to focus on lending than domestic banks. These results highlight the importance of a diversified banking sector, both in terms of asset ownership and business models, to ensure that the credit needs of domestic clients are catered for but can also benefit from technological innovation and product developments.

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## Appendix

Table A1 Bank business models in MENA and African countries

| Country      | Focused retail | Focused retail (b) | Diversified retail (1) | Diversified retail (1b) | Diversified retail (2) | Diversified retail (2b) | Diversified retail (3) | Wholesale | Investment | Total BM | N. of Banks |
|--------------|----------------|--------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|-----------|------------|----------|-------------|
| Algeria      | X              |                    | X                      |                         | X                      |                         |                        | X         | X          | 5        | 16          |
| Angola       |                |                    | X                      |                         |                        |                         |                        | X         | X          | 3        | 19          |
| Bahrain      |                |                    | X                      |                         | X                      |                         |                        | X         | X          | 4        | 26          |
| Botswana     | X              |                    | X                      |                         |                        |                         |                        |           | X          | 3        | 11          |
| Egypt        | X              |                    | X                      |                         |                        |                         |                        |           | X          | 3        | 33          |
| Ghana        | X              |                    |                        |                         | X                      |                         |                        | X         |            | 3        | 27          |
| Iran         |                |                    |                        |                         | X                      |                         |                        |           | X          | 2        | 18          |
| Iraq         | X              |                    |                        |                         |                        |                         |                        |           | X          | 2        | 14          |
| Israel       | X              |                    |                        |                         |                        |                         |                        | X         | X          | 3        | 14          |
| Ivory Coast  |                |                    |                        |                         |                        | X                       |                        | X         | X          | 3        | 15          |
| Jordan       | X              |                    | X                      |                         | X                      |                         |                        |           | X          | 4        | 16          |
| Kenya        | X              |                    | X                      |                         |                        |                         |                        |           |            | 2        | 39          |
| Kuwait       | X              |                    | X                      |                         |                        |                         |                        |           |            | 2        | 13          |
| Lebanon      | X              |                    |                        |                         |                        | X                       |                        |           | X          | 3        | 36          |
| Marocco      |                |                    | X                      |                         |                        |                         | X                      | X         | X          | 4        | 20          |
| Mauritius    | X              |                    |                        | X                       |                        |                         |                        | X         | X          | 4        | 13          |
| Mozambico    | X              |                    |                        |                         | X                      |                         |                        | X         | X          | 4        | 13          |
| Nigeria      | X              |                    | X                      |                         |                        |                         |                        |           | X          | 3        | 27          |
| Oman         |                |                    | X                      |                         |                        |                         |                        |           | X          | 2        | 10          |
| Palestina    |                |                    | X                      |                         | X                      | X                       |                        |           |            | 3        | 15          |
| Qatar        | X              |                    |                        | X                       |                        |                         |                        |           |            | 2        | 14          |
| Saudi Arabia | X              |                    |                        |                         |                        |                         |                        |           | X          | 2        | 14          |
| South Africa | X              |                    | X                      |                         | X                      |                         |                        |           | X          | 4        | 9           |
| Syria        |                |                    |                        | X                       |                        |                         |                        | X         |            | 2        | 14          |
| Tanzania     | X              | X                  |                        | X                       |                        |                         |                        | X         | X          | 5        | 33          |

|                      |   |   |   |  |   |   |   |           |
|----------------------|---|---|---|--|---|---|---|-----------|
| Tunisia              | X | X |   |  |   |   | 2 | <b>24</b> |
| Uganda               |   | X | X |  | X | X | 4 | <b>21</b> |
| United Arab Emirates | X | X |   |  | X | X | 4 | <b>30</b> |
| Zambia               |   | X |   |  | X | X | 3 | <b>12</b> |
| Zimbabwe             | X | X | X |  |   |   | 3 | <b>17</b> |

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Table A2 Variable description

| Name                                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Database                                                          |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| <b>Bank-specific variables</b>        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                   |
| ROE                                   | Return on Assets, a measure of bank profitability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | SNL Unlimited                                                     |
| NPL_TA                                | Ratio of non-performing loans over total assets, a measure of asset quality                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | SNL Unlimited                                                     |
| RWA_TA                                | Risk weighted assets density, a proxy for banks' risk appetite                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | SNL Unlimited                                                     |
| GROWTH_LOANS                          | The growth of gross loans, a measure of a bank' support to the real economy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | SNL Unlimited                                                     |
| <b>Macroeconomic variables</b>        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                   |
| LEVEL_OF_RESTRICTION                  | A measure of the level of restrictions on bank activities; a categorical variable that varies from 1 to 4. It equals 1 if the banking systems is allowed to engage in the full range of securities activities (e.g., brokerage, dealing on own account, portfolio management, investment advice, underwriting, venture capital activities, securitization); it equals 2 if the full range of the above activities are allowed but must be conducted in subsidiaries, or in another part of a common holding; it equals 3 if less than the full range of activities can be conducted in banks, or subsidiaries, or in another part of a common holding company or parent; and equals 4 if none of the above activities can be done in either banks or subsidiaries, or in another part of a common holding company or parent". The higher the value, the tighter the activity restriction | World Bank database                                               |
| GDP_GROWTH                            | GDP growth in US Dollar year on year; a measure of economic development                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | World Bank database                                               |
| CREDIT_GDP                            | Ratio of the domestic credit to the private sector over GDP; a measure of financial development                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | World Bank database                                               |
| FDI_NETINCOME_GDP                     | Foreign direct investment net income to GDP, a measure of openness to foreign investment and ability to attract foreign resources.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | World Bank database                                               |
| <b>Banking system characteristics</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                   |
| TOTAL_ASSET_SYSTEM                    | Total assets of the whole banking system, a measure of the size of each country's banking sector                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | World Bank database<br>The Bank Regulation and Supervision Survey |
| GOVERNMENT_TA                         | Ratio of bank total assets owned by the Government over GDP, a proxy of the importance of government ownership in the banking sector                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | World Bank database<br>The Bank Regulation and Supervision Survey |
| FOREIGN_TA                            | Ratio of bank total assets owned by foreign banks over GDP, a proxy of foreign banking                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | World Bank database<br>The Bank Regulation and                    |

|              |                                                                                                                                                       |                                                                               |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
|              |                                                                                                                                                       | Supervision<br>Survey                                                         |
| ISLAMIC_TA   | Ratio of bank total assets owned by Islamic banks over GDP, a proxy of the importance of Islamic banking                                              | World Bank<br>database<br>The Bank<br>Regulation and<br>Supervision<br>Survey |
| Emerging_MNB | Dummy variable that takes the value 1 if the bank is owned by a holding institution headquartered in an emerging country other than African countries | Author's<br>calculation<br>based on SNL<br>Unlimited                          |
| Global_MNB   | Dummy variable that takes the value 1 if the bank is owned by a holding institution headquartered in a developed country                              | Author's<br>calculation<br>based on SNL<br>Unlimited                          |
| African_MNB  | Dummy variable that takes the value 1 if the bank is owned by a holding institution headquartered in an African country                               | Author's<br>calculation<br>based on SNL<br>Unlimited                          |

Table A3 Correlation Matrix

|                             | ROE   | NPL_TA | RWA_TA | GROWTH_GL | LEVEL_OF_RESTRICTION | GDP_GROWTH | CREDIT_GDP | FDI_NETINFLOW | TOTAL_ASSET_SYSTEM | ISLAMIC_TA | FOREIGN_TA | GOVERNMENT_TA | Emerging_MNB | Global_MNB | Africa_MNB |
|-----------------------------|-------|--------|--------|-----------|----------------------|------------|------------|---------------|--------------------|------------|------------|---------------|--------------|------------|------------|
| <b>ROE</b>                  | 1.00  |        |        |           |                      |            |            |               |                    |            |            |               |              |            |            |
| <b>NPL_TA</b>               | -0.30 | 1.00   |        |           |                      |            |            |               |                    |            |            |               |              |            |            |
| <b>RWA_TA</b>               | -0.16 | 0.14   | 1.00   |           |                      |            |            |               |                    |            |            |               |              |            |            |
| <b>GROWTH_GL</b>            | -0.03 | -0.18  | 0.02   | 1.00      |                      |            |            |               |                    |            |            |               |              |            |            |
| <b>LEVEL_OF_RESTRICTION</b> | 0.18  | 0.06   | -0.22  | 0.00      | 1.00                 |            |            |               |                    |            |            |               |              |            |            |
| <b>GDP_GROWTH</b>           | 0.04  | 0.13   | 0.07   | 0.20      | 0.29                 | 1.00       |            |               |                    |            |            |               |              |            |            |
| <b>CREDIT_GDP</b>           | -0.11 | -0.14  | -0.10  | -0.02     | -0.34                | -0.34      | 1.00       |               |                    |            |            |               |              |            |            |
| <b>FDI_NETINFLOW</b>        | -0.09 | 0.12   | -0.07  | 0.00      | -0.14                | 0.14       | 0.12       | 1.00          |                    |            |            |               |              |            |            |
| <b>TOTAL_ASSET_SYSTEM</b>   | -0.24 | 0.01   | 0.16   | -0.02     | -0.36                | -0.12      | 0.19       | 0.33          | 1.00               |            |            |               |              |            |            |
| <b>ISLAMIC_TA</b>           | -0.18 | -0.17  | 0.25   | 0.01      | -0.55                | -0.21      | 0.08       | -0.26         | 0.22               | 1.00       |            |               |              |            |            |
| <b>FOREIGN_TA</b>           | 0.18  | 0.21   | -0.13  | 0.02      | 0.46                 | 0.35       | -0.38      | 0.38          | -0.34              | -0.49      | 1.00       |               |              |            |            |
| <b>GOVERNMENT_TA</b>        | 0.04  | -0.10  | 0.18   | 0.04      | -0.14                | 0.11       | 0.10       | -0.21         | -0.11              | 0.46       | -0.13      | 1.00          |              |            |            |
| <b>Emerging_MNB</b>         | 0.06  | -0.03  | 0.03   | 0.02      | 0.00                 | 0.02       | -0.05      | -0.03         | -0.05              | -0.04      | 0.01       | -0.05         | 1.00         |            |            |
| <b>Global_MNB</b>           | 0.18  | 0.03   | -0.06  | -0.07     | 0.14                 | 0.10       | -0.16      | -0.06         | -0.17              | -0.16      | 0.19       | -0.07         | -0.05        | 1.00       |            |
| <b>Africa_MNB</b>           | -0.07 | 0.23   | -0.05  | 0.03      | 0.27                 | 0.21       | -0.26      | 0.16          | -0.09              | -0.32      | 0.43       | -0.13         | -0.08        | -0.25      | 1.00       |

